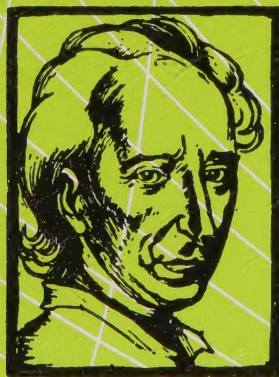


SMOKELESS AIR

JOURNAL OF THE
NATIONAL SOCIETY FOR CLEAN AIR



No. 131 ★ AUTUMN 1964 ★ 2s. 6d.

In this Issue

The Strasbourg Air Pollution Conference ★ The Hundredth Alkali Report
International Union for Clean Air ★ The Drive against Diesel Smoke
Air Pollution at Stockton on Tees ★ etc., etc.



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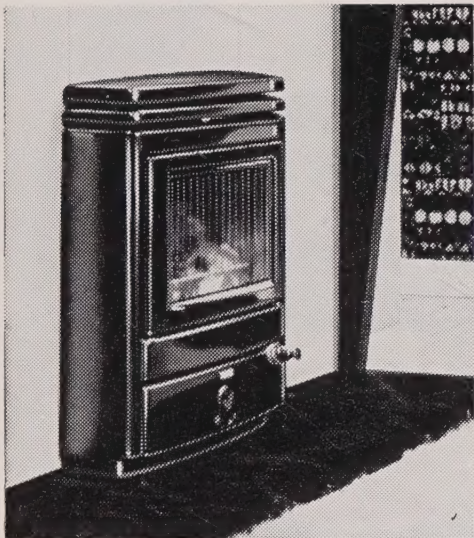
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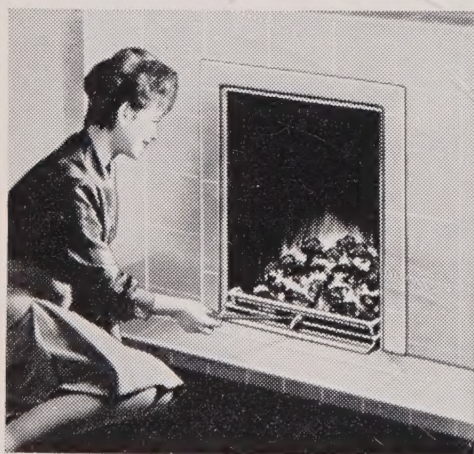
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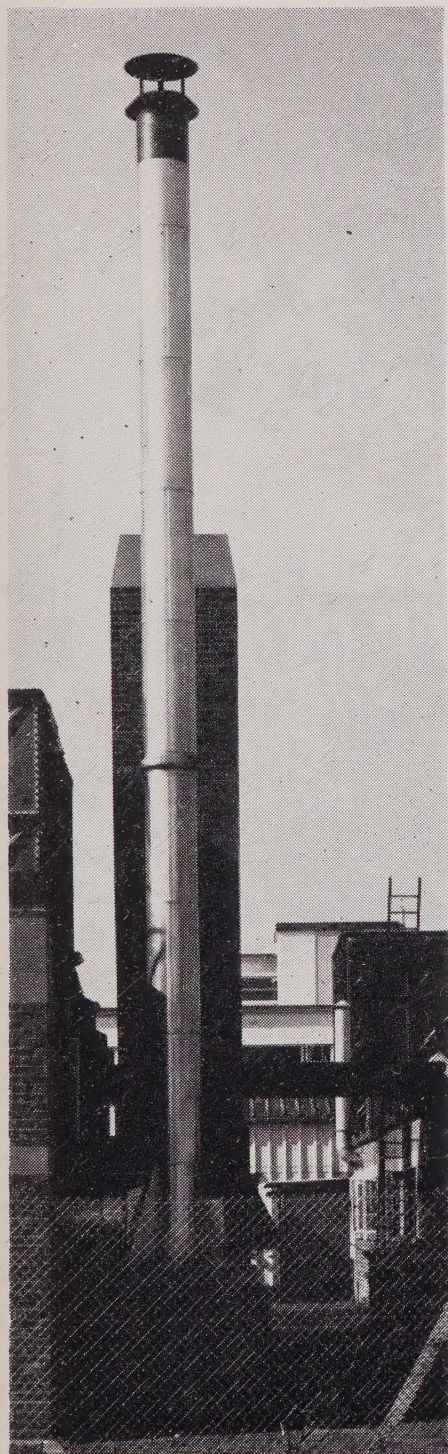
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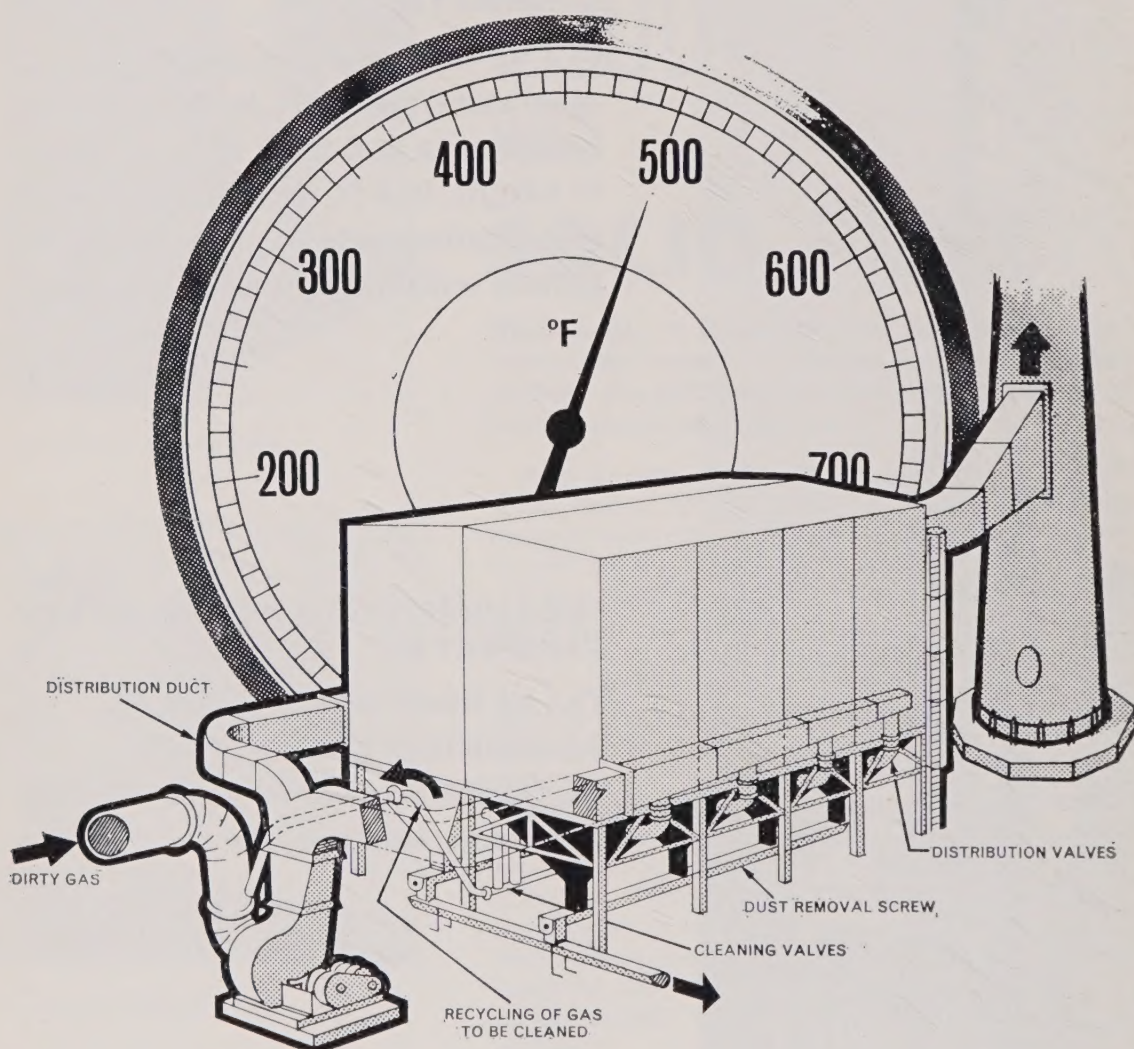
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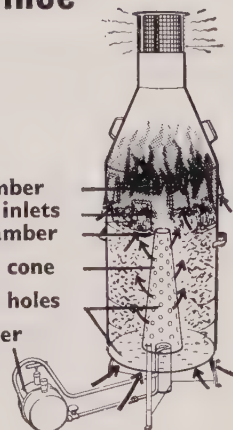
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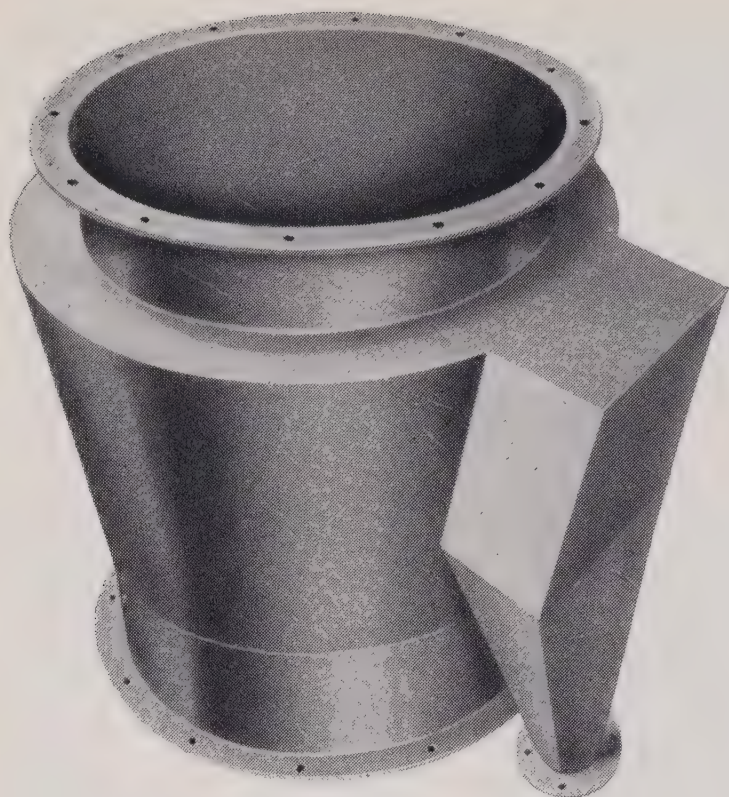


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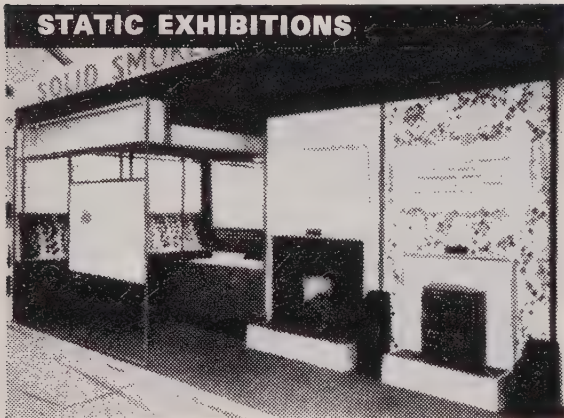
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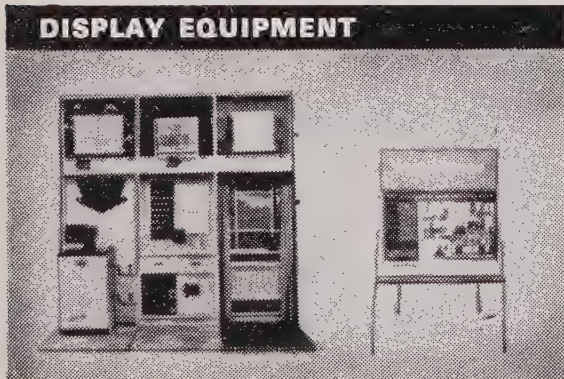
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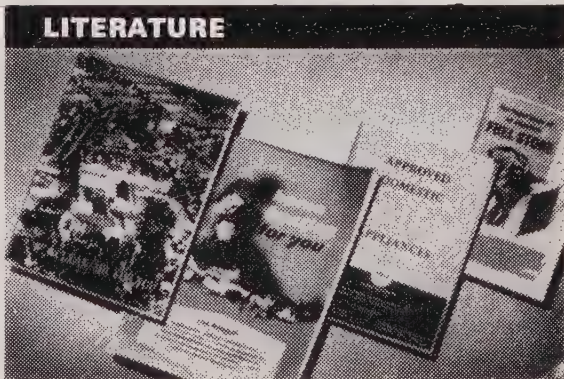
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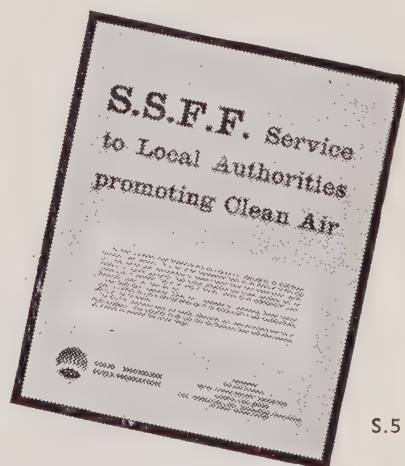
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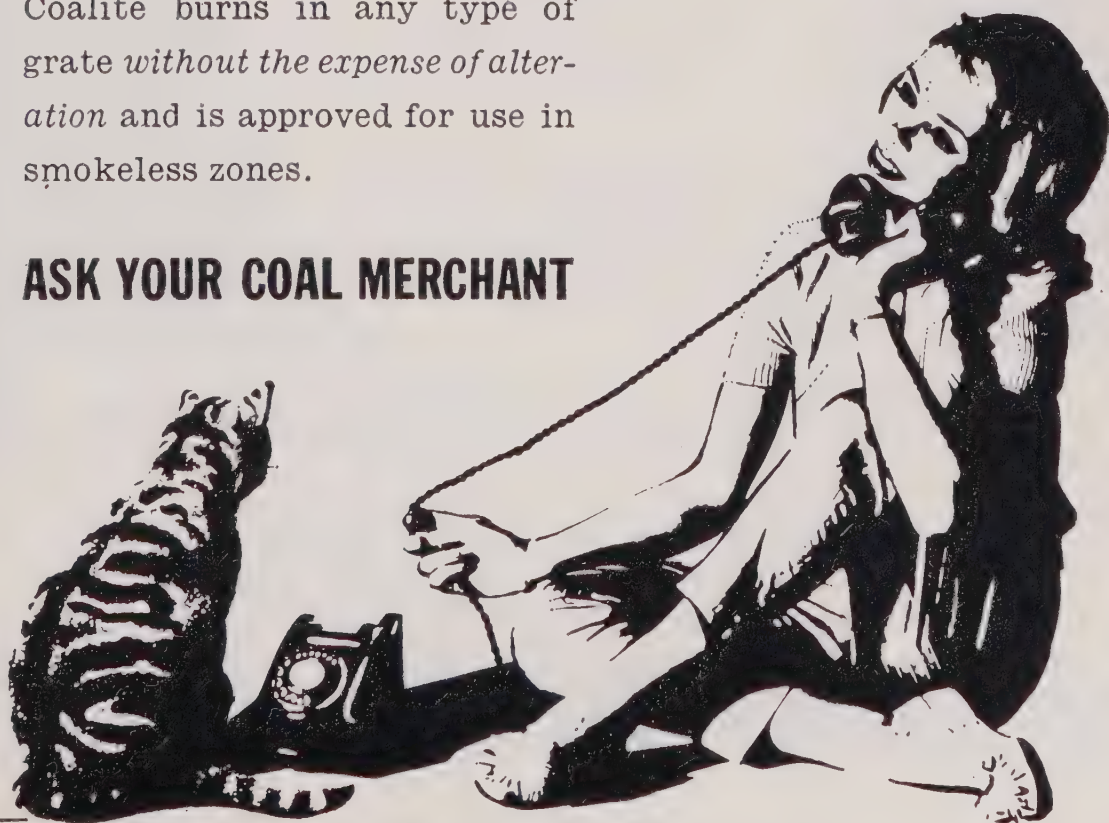


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SMOKELESS AIR

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Autumn 1964

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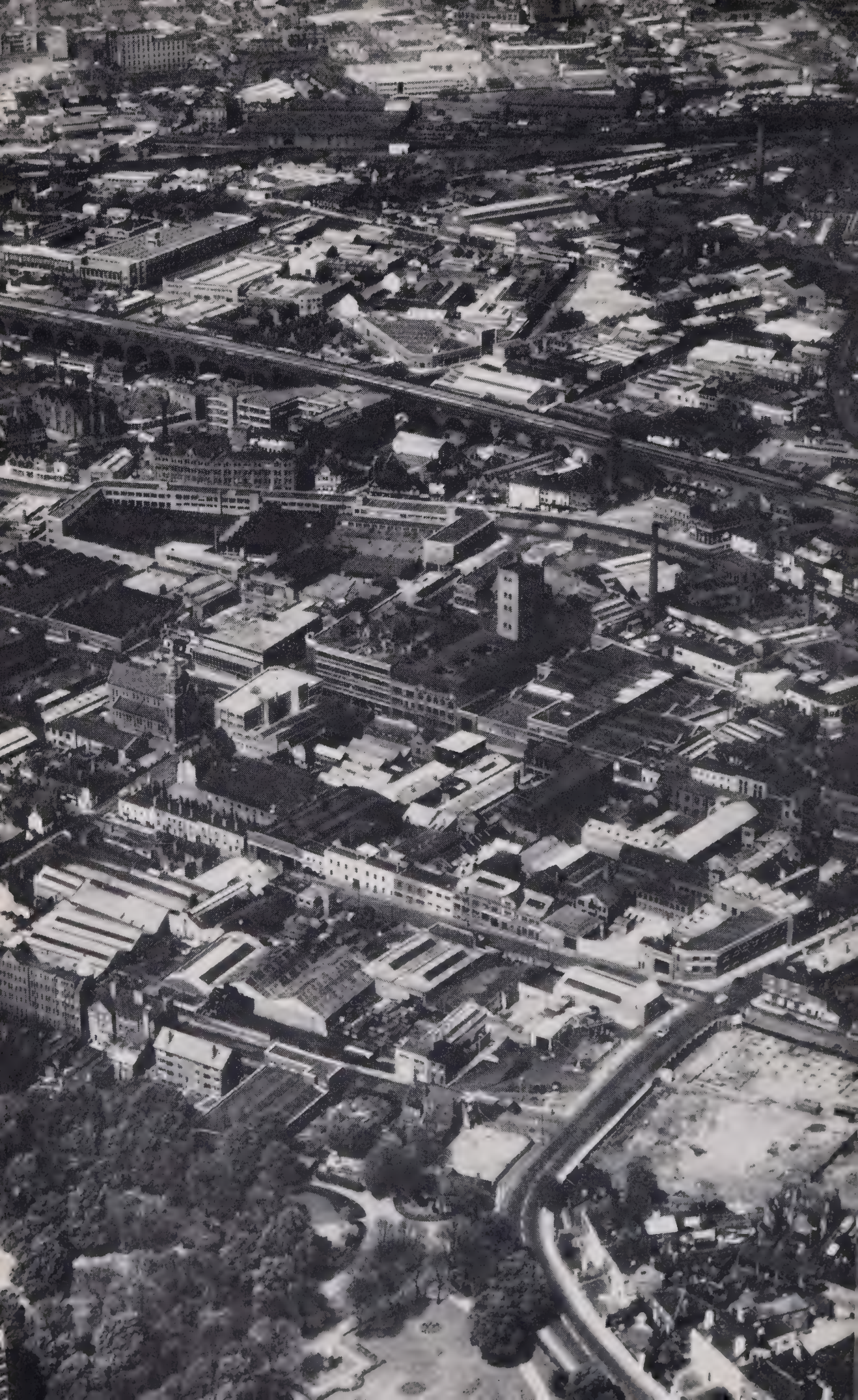
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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

CLEAN AIR INTERNATIONAL

THIS issue of SMOKELESS AIR contains a full report of the Council of Europe's Air Pollution Conference at Strasbourg, and an account of a meeting at Washington to discuss proposals for the setting up of an International Union of air pollution control organizations. Both events are important indications of the growth in recent years in many countries throughout the world of anxiety about air pollution, and of a corresponding desire to discuss problems with, and to learn from, other countries.

A few decades ago virtually the only countries actively organized to deal with air pollution were the United Kingdom and the United States. Today we find organization, investigation, research and legislation in many countries and in every continent. This is the natural result of the tide of industrialization flowing from the north Atlantic countries to almost every corner of the globe. With industry, the growth of urban populations, and the coming of the motor vehicle, has come air pollution or the threat of its coming. It has become an international problem and is demanding international co-operation and co-ordination.

Already specialized bodies have been able to study aspects of the problem that are appropriate to them, and we have had meetings, committees and reports from the World Health Organization, the Organization for Economic Co-operation and Develop-

ment, the International Union of Local Authorities, and so on. The National Society for Clean Air was able to stimulate the trend by its Diamond Jubilee International Conference in London in 1959—an event that proved to be larger and in every way more successful than had been anticipated.

The value of and need for international co-operation is generally and wholeheartedly recognized. How it is to be achieved, the form it should take, and the functions it should assume, are questions that have started to be debated and will require much more thought and discussion. The Strasbourg conference, while in agreement with the principle of closer ties, showed differences of opinion on whether the Council of Europe should itself set up some form of European centre on air pollution, or whether existing agencies should continue and develop their specific activities. To what extent can the Council of Europe member countries co-ordinate their efforts in air pollution study and control? To what extent could a fully international body, perhaps under the United Nations, be established? To what extent could existing bodies be responsible for the air pollution aspects of their particular disciplines—such as health, economics, industrial technology? These are among the many questions to be resolved.

The report on another page of the purpose and outcome of the talks held at Washington shows that what is

envisaged is a grouping of the non-governmental bodies, such as our own N.S.C.A., for collaboration in general and for holding regular international conferences in particular. As our own Society has so well proved, a great deal of value can be achieved by voluntary associations, and it is clear that by working together they can do much more. They have the advantage of being free from the restrictions inherent in governmental bodies, although by the same token they have meagre funds.

If the Union comes into being it could have similar relationships with official organizations as, for example, our Society has with our own Government departments.

To sum up, the international clean air situation is in a hesitant but promising condition. It is a necessary stage of development and as such is to be welcomed, while every encouragement must be given to all who are

concerned with the promotion of further progress. Apart from our own Alkali Inspectorate, an official body, whose centenary report we review on another page, the N.S.C.A. is the oldest of all air pollution control organizations, and we should be ready to encourage and assist in every way the advancement of international co-operation. This is not pure altruism: although this country has a lead in many respects over those whose problems came later, there is much we can learn from them.

This journal started an International Section after the 1959 conference and hopes to maintain and extend it as a service to the cause of world-wide clean air. As our report of the conference mentions, an offer was made at Strasbourg to put these pages at the disposal of any international organization that might be set up, until such time as it might have its own publication.

The Cost of Clean Air

There have been some sharp criticisms recently on the rise in the price of solid smokeless fuel, particularly from the Warwickshire Clean Air Council, the Domestic Coal Consumers' Council, and the *Guardian*. The fuel affected is Sunbrite, the hard coke on which much depends for the progress of the new smoke control area policy, under which such fuel is the mainstay for use in room-heaters and underfloor draught fires.

All price increases are regrettable, and this especially so. But, during a period of continuous inflation, they are sooner or later inevitable. In this instance the rise had to come because the manufacture of the fuel was involving a loss to the N.C.B. or to the private coke ovens also producing it. To demand that the price should remain constant when inflation is steadily pressing, is another way of saying that the fuel should be subsidized. We cannot expect it to continue to be produced at a loss, and more

particularly could hardly expect increased production, which may be needed, to be made with an increased loss.

The question moves from the particular instance to the general: should the clean air movement be assisted by subsidizing the fuels it needs? If the price of one solid smokeless fuel is to be kept down, why should not the prices of the others, and of gas, electricity and oil? And should this apply everywhere, or in smoke control areas only? The cost of the new equipment required in smoke control areas is already subsidized, and it would undoubtedly make smoke control more popular if grant was payable also on the fuels. The practical difficulties of attempting this are at once apparent, and its equity would at once be challenged. Who would pay the subsidy, and would it continue in perpetuity, are but two of the questions that would be asked.

The case for smoke control is made

possible by the fact that those affected have the choice of a fuel that will either give them equal heat at less cost than they paid before, or more heat at equal cost; or alternatively, if it is preferred, a more expensive heat source with a discount on the equipment. It is not always easy to explain all this to the public, and there is no doubt that there is a value in having a favourable price differential between the coal that was used and the fuel that is to be used. Long-term savings are less apparent.

The alternative to maintaining the differential by subsidizing the smokeless fuel would be to increase the price of the coal. This has been proposed more than once in the past, and a levy or tax on raw coal (which might be used to keep down the price of smokeless fuel) certainly has its attractions. It could well be called a smoke tax, because the use of the coal creates the smoke that injures the community and imposes on it a serious running cost. If such a tax were practicable and also acceptable, it would presumably have to be confined to areas due to be smoke controlled. In throwing out, or rather disinterring, this idea it must not be thought that we are advocating it. We believe that, if properly explained, the case for smoke control will be accepted on its merits and that neither subsidies nor taxes are really necessary.

That Election

In our last issue we indulged in a restrained grumble about the difficulties caused to ourselves and many others because of uncertainty about the date of the general election. A prominently printed letter in the *Times* later made a similar point, and our own comment was quoted in a number of newspapers. As we go to press the date has still not been announced, though no doubt it will have been by publication date. Whatever it may prove to be, the Society's conference and exhibition will be held as planned—it is just not possible to change the dates at this stage—but we do hope that we shall not be disenfranchizing a thousand or so voters.

The Centenary

On another page we review the 100th report of the Chief Alkali Inspectors. This is a centenary we are glad to be able to record, and which provides an opportunity for congratulating the Inspectorate on the record it has created. It is a justified occasion for pride (for us all) that just as air pollution control is becoming a matter of international collaboration and more and more national legislation is being enacted or proposed, that here in Britain we should be celebrating a hundredth report. The occasion is unique, and for that matter so are the contents of the report. We do not think any other country could show so much practical preventive action in a single twelvemonth and as a matter of accustomed routine. The Alkali Inspectorate, during its century of effort, has inevitably from time to time been criticized for not doing this or being too lenient about that, but the brickbats have become rare of late. Co-operation between the Inspectors and the local authorities on the one hand and between them and industry on the other, can be seen to be growing all the time and to be paying dividends. The Society is fortunate in that, at the forthcoming conference at Harrogate, it is to have a *Des Vœux* Memorial lecture by the Chief Inspector for England and Wales, Dr. J. S. Carter. This, entitled "A Century of Achievement" comes just before Dr. Carter retires, and having seen the manuscript we can assure members and delegates who will be present that they have a fascinatingly told story to look forward to.

Apology

In our last issue we published a photograph showing an area of smoking domestic chimneys, with a caption saying that it was of Greenock. It was taken by a Greenock photographer and published first in the *Greenock Telegraph*, but it was in fact a view of the adjoining borough of

Port Glasgow. We are glad to express our regret at the error, especially as it appears to have caused some indignation. It is an interesting point though, and a sign of the times, that a wrongly attributed picture of smoking house chimneys should cause indignation.

Dusseldorf Venture

The V.D.I. Commission for Air Pollution in West Germany is organizing a conference and a clean air exhibition at Dusseldorf in April, 1965. Although it is a new field of activity for the Society, we are collaborating with the Board of Trade, and acting as a liaison body with individual British firms who manufacture air pollution prevention equipment, in the

organization of a composite U.K. section or stand. Readers may recall Sir Keith Joseph's remark at our meeting in April, on the stimulus to exports that could be given by the technical developments that have been called for because of the Clean Air Act. This is a practical example of what may be done. Further particulars of the conference and the exhibition may be obtained from the Society on request.

Too Bad

We liked the newspaper report of the man in Yorkshire who, digging over the garden of his new bungalow, uncovered a good and workable seam of coal. The irony of it is that the bungalow is in a smoke control area.

HOUSING ACT, 1964

Amendments to the Clean Air Act, 1956

As we go to press we have received a copy of a new Circular (46/64) from the Ministry of Housing and Local Government to local authorities in England and Wales. This relates to and describes Section 95 of the new Housing Act, which amends the Clean Air Act in certain important respects. These amendments concern only housing matters—namely, the smoke control area provisions of the Clean Air Act. Section 95 came into force on August 16, 1964.

The first subsection concerns "new dwellings" and their eligibility for grant, amending the 1956 Act so that houses built or begun up to August 16, 1964 become eligible, even where they have previously been given grant for appliances no longer suitable because of fuel unavailability. A new building regulation, about which local authorities are being consulted, will in due course replace Section 24 of the Clean Air Act, on building byelaws.

The second and third subsections deal with the designation of appliances

—*i.e.* appliances which are designated as unsuitable for grant because suitable fuel will not be available in an area. The fourth and fifth subsections are concerned with greater flexibility for approval of expenditure for grant purposes, and the sixth, seventh and eighth relate to discretionary grants which will allow Exchequer grants to be increased in specified circumstances. Subsection 9 permits grants for supplying means of ignition even when, as was the previous restriction, "works" are not involved.

It is hoped to review Section 95 of the new Act in more detail in our next issue.

Dr. R. Lessing

We regret to record the death, as this issue was going to press, of Dr. Rudolf Lessing, C.B.E. Dr. Lessing was a member of the Executive Council, a Past President, and had been associated with the Society since 1908. He was 86. A full appreciation will be given in our next issue.

Northern Ireland Clean Air Act

Royal Assent Received

Royal Assent was given to the Clean Air Act (Northern Ireland), 1964, on June 9. The Act may be obtained from H.M. Stationery Office at 3s. 6d. net. A Circular (PH 16/64) has been issued to local authorities, together with an explanatory memorandum.

The Act is very similar to the Clean Air Act, 1956, although there are certain differences of substance as well as differences related to administrative procedures. The part relating to smoke control areas contains the amendments that have been included in the new Building Bill.

The Act also includes an entirely new section (28) on "suspected offences in relation to motor vehicles", which requires an authorized officer of a local authority to report to the Ministry of Home Affairs on motor vehicles that are suspected of not complying with the smoke, etc., regulations made under the Road Traffic (Northern Ireland) Act, 1955.

Section 31 gives powers for future action to be taken in respect of gaseous emissions, no doubt with

sulphur dioxide principally in mind. The first sub-section reads:

"Where the Ministry is satisfied that practicable means exist for reducing or controlling gaseous emissions from a chimney, the Ministry, after consultation with such organizations as appear to it to be representative of interests substantially affected, may by regulations made subject to affirmative resolution make provision for the reduction or control of such emissions."

The section of the 1956 Act that provides for the setting up of a Clean Air Council for England and Wales, and one for Scotland, is omitted. It is the view of the Northern Ireland Government that it is close enough in touch with responsible representative bodies (including the N.I. Division of the N.S.C.A.) to enable it to obtain information and discuss questions that may arise without setting up a new committee or council.

The Act is not yet in operation. This will take place on a day to be appointed by the Minister of Health and Local Government.

Questions in Parliament

In the House of Commons on June 8, **Mr. John Hall** asked the Minister of Housing and Local Government and Minister for Welsh Affairs if he is aware of the rise in the percentage of sulphur dioxide in the atmosphere; and what effect this increase is likely to have on public health.

Mr. Corfield: Disregarding fluctuations caused by weather conditions there has for at least the last 10 years been no detectable trend upwards or downwards in the ground level concentration of sulphur dioxide. The second part of the Question therefore does not arise.

Dr. A. Thompson (July 31) asked the Secretary of State for the Home

Department how many successful prosecutions there were in 1963 for causing or permitting vehicles to emit an unnecessary or excessive amount of noxious or offensive gases.

Mr. Woodhouse: Provisional figures show that in England and Wales during 1963 there were 2,867 prosecutions under the Motor Vehicles (Construction and Use) Regulations for the unlawful emission of smoke, etc. It is not known how many of these were successful.

Sheffield's Clean Air Programme

According to a statement made by the Sheffield Health Committee Chairman, Alderman Mr. Patience Sheard, the city's clean air programme is now firmly scheduled to be completed by 1972.

THE DRIVE AGAINST DIESEL SMOKE

At a Ministry of Transport Spot Check

DIESEL-ENGINEED vehicles emit little or no smoke if they are correctly maintained—that is, if they are in good mechanical condition generally, and particularly if the fuel feed and injection system are right. A properly tuned vehicle creates no offence.

In short, the widespread nuisance of excessive smoke can be controlled or prevented by enforcing proper maintenance. The policy that has been advocated by the N.S.C.A. is that offenders should be required to put their vehicles in good order and that they should be prohibited from operating until this was done. This, it has been considered, is a better and more certain incentive to good practice than purely punitive measures.

This is the approach to the problem being actively followed by the Ministry of Transport by means of the roadside checks being carried out by its Vehicle Examiners. National checks—that is checks carried out at a number of points throughout the country on the same day—have been reported in the press and in this journal, but it is not generally realized that more frequent checks on an area level are continually being held.

By invitation, the Editor of this journal was present as an observer at one such check held recently on the A20 road at Wrotham Hill in Kent. It was not only an interesting but a heartening occasion.

Near the summit of the hill is a large and convenient lay-by (which provides



A "smoker" observed and about to be halted on Wrotham Hill

a splendid view over Kent). The procedure was for vehicles coming up the hill to be watched, and for those emitting too much smoke to be diverted into the lay-by and halted by a uniformed Police Officer. Examination of the vehicles (for smoke only on this occasion) was made by the two Ministry Examiners who were present with a Senior Examiner. Although a full diagnosis of the trouble cannot usually be made on the spot, its existence was demonstrated by running the engine and discussing the problem with the driver. The actuality of the smoke emission was shown by giving the engine a burst at full power—often to the surprise, real or assumed, of the driver.

If the smoke is shown to be excessive the driver is there and then served with a notice, a printed form GV9, which prohibits the use of the vehicle until the defects that are specified have been rectified. The notice may state that the prohibition comes into force immediately, or on a specified date, and “shall continue in force until it is removed or withdrawn by a Certifying Officer or Examiner appointed by the Minister of Transport”. A copy of the GV9 is also sent to the owner of the vehicle by registered post, and a copy is sent to the Traffic Area Licensing Authority. The prohibition is in due course removed or withdrawn by issue of another form, GV10 after the vehicle has been re-examined by a Vehicle Examiner and he is satisfied that the defect has been rectified.

An “immediate” notice means that the vehicle cannot continue to be operated. It must be attended to on the site, or can be unloaded and driven away. This is applied when continued operation would be dangerous, and more usually a period of one, two, or more days (the maximum is ten) is allowed before the prohibition becomes effective. There were no “immediates” on this occasion.

On this particular check, which continued for 90 minutes, 18 vehicles were halted and inspected. Four were given the benefit of doubt, and the other 14 were served with GV9’s. Sometimes,



Almost a black-out for the camera



An Examiner gets down to his job



The refuse collector that came in on its own accord (to empty the lay-by litter bins) and found trouble

if a prohibition is not made, a warning letter is sent to the owner.

The number of vehicles passing were not counted, but those emitting excessive smoke were definitely a small minority, and the two examiners were able to deal comfortably with the offenders. It was said that there had



Demonstrating to a driver how his engine is behaving

been a considerable improvement during the last few years—at one time six examiners would have been needed at this particular site.

Impressions

One's main impression was that this was a sensible, practical and above all effective form of control and was preferable to the taking of cases to court by the Police. That is not to say that police action should be ended, for it can be of value. But it is only likely to be taken in more flagrant cases, where a conviction is probable. It takes up the time of the Police and of the courts, and the fine that may be imposed may well be less hurtful to the offender than is putting a vehicle off the road.

One was also impressed by the keenness, the fairness, and the knowledgeability of the examiners, their firm but friendly way of approaching the drivers, and the educational value of the way they explained and discussed the difficulties. Because of this the drivers generally accepted the position in a reasonable and co-operative way.

Often, indeed, when they have been trying to get the owners to attend to defects, they will welcome the serving of a notice.

The check lasted for its optimum time. If they continue too long the news passes down the road and approaching vehicles may reduce speed to cut down smoke, or may even take another route. As it was, smoke sometimes vanished from an approaching lorry half way up the hill.

The Society, at its last conference, passed a resolution addressed to the Minister of Transport, urging that the spot check campaign be stepped up, and that more vehicle examiners be appointed to make this possible. We understand that progress in this direction is being made, and that it is intended both to continue and to increase the frequency of the checks.

A more expert and detailed picture of the diesel smoke problem, and of the work being done by the Ministry, is the subject of one of the papers to be presented at the N.S.C.A. conference at Harrogate in October, by Mr. H. D. Fawell.

The Hundredth Alkali Report

THE Hundredth Annual Report on Alkali, &c. Works, by the Chief Inspectors, 1963. Presented to the Minister of Housing and Local Government and the Secretary of State for Scotland. pp. 84. H.M.S.O., London. 5s. 6d. net.

A comment on this report appears in our editorial notes, and here we need only say that its centenary aspects are dealt with quite unobtrusively in a paragraph in the introductory section and by an appendix that surveys the first Alkali Act and the work of the first Inspector, Dr. Robert Angus Smith.

In his introduction, discussing the changed situation, Dr. Carter writes:

“The chemical scene has indeed changed since 1863. The great Leblanc system, with its train of ancillary processes then dominating the industry is now a fading memory. The then callous disregard of black smoke emission is today unthinkable. The feared world starvation due to a nitrogen famine has long since vanished with the production of nitrogen compounds from the inexhaustible reserves of the air. The coming of electric power has opened up new production routes. Many of the older processes are dead or so greatly altered as to be almost unrecognizable. Catalytic and synthetic processes are providing abundant supplies of what were once mere laboratory curiosities. Petroleum refining with its still growing daughter industry of petrochemicals has developed from nothing to a vast and necessary industry. Things undreamed of by the early inspectors, man-made fibres, bromine and magnesium from sea water, plastics, nuclear fission and the like are not accepted as commonplace. Manual labour has been largely supplanted by the services which chemical engineering has evolved. Most plants are fitted with

instrument panels continually scanned by skilled operators. Little if anything is now haphazard or dependent on traditional rule of thumb methods.”

Dr. Carter goes on to say that despite all changes the fundamental requirement that industry shall use the best practicable means to render its emissions harmless and inoffensive, is timeless, and the proof of this is shown by the fact that the past five years have seen a greater expansion of the scope of the Act than had the previous 95.

Another paragraph that may be quoted in full reads:

“I am pleased to record the increasing and cordial liaison between the inspectorate and the officers of local authorities. It is an instruction to the inspectorate that routine calls on local authorities to review matters of mutual concern are an integral part of their duties. One result of these calls is that written correspondence concerning industrial emission between local authorities and the Ministry has fallen to almost negligible proportions.”

Of the iron and steel industry the report says: “Remedies are expensive, especially at the larger works. The means for dealing with gases from a sinter plant have cost up to £500,000. Fume plants for dealing with emissions from oxygen steel processes have cost between £500,000 and almost £1,500,000, depending on the size of the works. At one large integrated works the cost of clean air measures was £3,300,000. These figures show the efforts the industry is making to be as good a neighbour as circumstances permit.”

The case of the Tees-side “cat-smell”—which featured in the report for several years—can now be written off, says the Chief Alkali Inspector. “The tracking down of this smell was an interesting piece of chemical detective work, the smell not being

associated with any particular part of the river or immediately attributable to any specific operation." He goes on to describe the way in which, under certain weather conditions, the substance "having the requisite tomcat bouquet" was produced and eventually prevented.

During 1963 the scope of the Alkali Inspectorate's activities was extended. This was of especial importance as regards Tees-side, since control of the emissions from virtually the entire heavy chemical industry of the region became the responsibility of the inspectorate, among them the amines plant at Billingham, source of the "fish smell" at times noted in industrial Tees-side. The report says that great care and elaborate measures are taken to prevent emission but that the nature of the products is such that no guarantee of complete immunity can be given. There is no public health hazard.

Ceramic Works

The section dealing with ceramic works describes the changeover to types of ovens capable of smokeless firing. In the Stoke-on-Trent area, "Over 98 per cent of the smoke from pottery manufacture has thus disappeared, particularly noticeable in the cleaner conditions now existing in this area of concentrated production."

"Any cement works is usually an unpopular neighbour and a concentration of cement works invariably leads to complaint," says the report. "Any dust-fall from the chimneys . . . is at once apparent, and there is seldom or never uncertainty as to its source. It is tempting to muse that were cement dust darker in colour, it might be less noted and less resented. There is no doubt as to the dislike expressed by householders and especially by housewives. It is against this background that the inspectorate has begun its steady new appraisal of the national position and has affirmed that . . . no kiln must operate without external means of dust arrestment."

The number of specific complaints investigated by the Inspectorate in

1963 concerned 323 works compared with 297 in 1962, and as in earlier years the degree of justification varied. Complaints concerning registered works were most numerous against gas and coke works (45), ceramic and electricity works (39 each), iron and steel works (28), cement works (16) and aluminium works (11). The total number of visits and inspections carried out during the year was 10,850 compared with 10,768 in 1962.

The Scottish Report

The report includes the report for 1963 for Scotland, by the Chief Inspector, Dr. E. A. B. Birse. There are 275 works registered and the number of processes inspected within these works totals 375. 442 visits and inspections were made during the year, and the report discusses the more important processes in some detail. An appendix reviews the working of the Alkali Act in Scotland from 1863 to 1963. Dr. Birse mentions that the inspectors would frequently travel to a works by horse cab, from which they would descend attired in frock coat and silk hat.

SIR JOHN CHARRINGTON

Sir John Charrington has just retired as Chairman of Charrington, Gardner and Locket, Ltd., having served the company ever since 1906. He has been elected President of the Company for life. We should like, on behalf of the many of our readers who know and admire Sir John, to take the opportunity of wishing him well in his retirement.

The clean air movement owes him a debt of gratitude for the wise and far-sighted way in which he has led the solid fuel distributive trade forward to understand and accept the need for the use of modern smokeless methods. Sir John is a member of the Clean Air Council and (representing the National Federation of Coke Distributors' Associations) of the N.S.C.A. Executive Council.

READY FOR HARROGATE

As announced in a stop press paragraph in our last issue, because of uncertainties about the general election the Minister of Power had informed us that he would not, after all, be able to open the Harrogate conference and exhibition. We are however very glad to be able to report that the opening, and opening address, will be by the Rt. Hon. Lord Sherfield, who is no doubt still better known as Sir Roger Makins, G.C.B., G.C.M.G., until recently Chairman of the Atomic Energy Authority.

The conference will now have the opportunity of hearing from high authorities in all the energy industries—coal, gas, electricity and oil, as well as atomic energy.

Lord Sherfield will open the conference and exhibition on the Tuesday morning, 20th October, and the others will be together on the platform, when there will be addresses on the contributions to clean air that we can look forward to from the four industries. The speakers will be Sir Henry Jones, Chairman of the Gas Council, Mr. Frank Wilkinson, Board Member for Marketing, National Coal Board, Mr. C. T. Melling, Electricity Council, and Mr. E. Randall, of Shell-Mex and B.P. Ltd.

A notable contribution to the conference will be the Des Vœux Memorial Lecture, revived after a lapse of several years, by Dr. J. S. Carter, the Chief Alkali Inspector. The title of the lecture will be "A Century of Achievement". Dr. Carter will be retiring shortly after this, and the lecture will be (officially at least) his swan-song.

Other sessions of importance will be on air pollution and town-planning, with papers by Professor J. K. Page of Sheffield University and by Dr. S. R. Craxford and Mrs. L-M. P. M. Weatherley; the Presidential Address; a paper on road vehicle pollution and what is being done about it by Mr. H. D. Fawell of the Ministry of Trans-

port, and discussion on a series of reports from the Divisions on the smoke control area situation in their respective areas. Also, to end the conference, will be the presentation of an important report on sulphur dioxide, on which the Technical Committee has been working for the past year. To secure the additional publicity this report should have, it may have been issued to the press prior to the conference.

The Exhibition

The Clean Air Exhibition in the adjoining hall will also be opened by Lord Sherfield, and will be one of the biggest and most diverse yet staged by the Society, with a very comprehensive participation by those supplying the fuels or the appliances for aiding industry and advancing smoke control area progress.

To publicize the exhibition and at the same time stimulate interest in clean air in Yorkshire, a novel competition for schoolchildren is being organized. They are being asked to submit what is called a "storyboard"—an outline scenario—for a television story or spot on clean air, on the lines of a TV commercial. Some remarkably valuable prizes have been donated by well-wishing firms and organizations, and will be presented at a theatre show during the conference. The best efforts will be displayed in the exhibition and there will be another competition, open to adults, in judging their merits.

North Western Fuel Luncheon Club

This all-male club, the President of which (after many years as secretary) is Sydney Duguid, recently opened its doors to a woman guest speaker. She was Miss Mary George, Director of the Electrical Association for Women, and also Chairman of the N.S.C.A. Publicity Committee.

INTERNATIONAL UNION FOR CLEAN AIR PROPOSED

Outcome of Washington Talks

The possibilities of an international union or federation of air pollution associations has been discussed, perhaps rather sporadically, over the last few years, following the impetus given to the idea by the Society's International Conference in London in 1959. Now, on the initiative of the Air Pollution Control Association of America, and thanks to the generosity with respect to expenses of the U.S. Public Health Service, a meeting of representatives of six national organizations was convened and held in Washington, D.C., on June 18 and 19 last.

The six national associations, all non-governmental in character, and their representatives, were as follows:

Air Pollution Control Association of America (Dr. C. E. Barthel).

Asociacion Argentina Contra la Contaminacion del Aire (Dr. J. A. Rispoli).

Association pour la Prévention de la Pollution Atmosphérique, France (Professor A. Roussel).

Kanto-Shin-Etsu Heat Control Society, Japan (Mr. Takahide Taga).

National Society for Clean Air, United Kingdom (Mr. Arnold Marsh).

VDI-Kommission Reinhaltung der Luft (Dr. H. Stephany).

The meetings first discussed the principles on which an international union might be founded, and the objects it should pursue. Then came the formulation of a constitution, on which, after much discussion, unanimous agreement was reached. The meeting had no powers to take action other than agreeing to submit the draft constitution to the governing bodies of their respective associations, with a recommendation that it be approved.

The national associations may, of

course, wish to amend the proposals and further discussions (by post) may be required before complete agreement is reached. It would therefore be premature to describe the proposals in any detail at this stage.

It may however be said that it is proposed that membership of the international union should be confined to non-governmental organizations. From this it inevitably follows that there will be little in the way of funds to attempt to set up any kind of world organization with its own offices, staff, services and frequent meetings. What is envisaged is a flexible organization that to begin with would sponsor periodic (once every four years is suggested) international conferences, with a president and secretary from the host country for the next conference. If successful, the Union could move by stages to other fields of activity. It is of course hoped that more national associations will come into being and make possible a larger membership. The proposed constitution is based on one that exists and is successful in another field of technical endeavour. The proposals will shortly be placed before the Executive Council of the N.S.C.A. for their consideration.

At the close of the meetings, which were held in Government offices in Washington's extensive administration quarter, a Press conference was held for the six delegates, after which they were received by Mr. Allen M. Pond, Assistant Surgeon General for Plans, Public Health Service, and Mr. James M. Quigley, Assistant Secretary, Department of Health, Education, and Welfare. Mr. Quigley is largely concerned with the operation of the new U.S. Clean Air Act.

Houston

On the Saturday following the



Press conference arranged by the U.S. Public Health Service at the end of the Washington meetings. Seated, left to right, are Mr. Taga (Japan), Dr. Rispoli and Dr. Torti (Argentina), Dr. Barthel (U.S.A.), Dr. Stephany (W. Germany), and Mr. Marsh (U.K.). Cut off on the print, unfortunately, is Professor Roussel (France). Standing behind the delegates are interpreters

Washington talks the party was flown to Houston, Texas, where the annual convention of the Air Pollution Control Association was beginning. For the British delegate this was a long-hoped-for opportunity to meet friends known for years only by correspondence. A dinner with leading members of the Association was held on the Sunday evening for the overseas visitors, during which they were asked to speak on their respective associations and the clean air situation in their own countries. There was also an opportunity to say a few words at the opening of the conference on the Monday morning—and then, most unfortunately, Professor Roussel and the writer had to leave to catch the only plane that would enable them to be at the opening of the Strasbourg conference on the Wednesday morning. Enough of the conference was seen,

however, to enable one to sense its keenness, the wide scope of its interests, and the friendliness of its members. Elsewhere we list a short selection of the 130 papers that were presented at the conference to the record number of 1,200 delegates attending.

Group Heating Offered to Sheffield

The Yorkshire Division of the National Coal Board have made a bid to supply piped heat for Sheffield Corporation's Kelvin housing development, which will provide nearly 1,000 homes with heat and hot water.

The board would provide and operate a boiler plant at the flats and sell the heat to the corporation. More than 4,000 tons of coal a year would be burnt smokelessly. It would probably come from Brookhouse Colliery, near Sheffield. This would be the first group heating by coal in Sheffield.

International Section

The Strasbourg Conference

A First Review and Summary of the Proceedings

THE Air Pollution Conference organized and convened by the Council of Europe and held at Strasbourg in Alsace from June 24 to July 1, was the most comprehensive and longest event ever held on the problem. It lasted for eight days (with a break on Sunday) and covered virtually all aspects of the subject. Fourteen points, or items, had been chosen for study and discussion, on each of which a working party of national rapporteurs had produced a general report. Each session of the conference, apart from several independent addresses by Ministers from the countries represented, consisted of the presentation of these reports and their discussion. Finally, there were winding-up speeches and consideration of resolutions which it was open to any participant to submit. The number of such resolutions grew to forty, and fortunately it was agreed that they should not be voted upon but should be considered by a special committee that would report to the Committee of Ministers which constitutes the executive body of the Council of Europe.

Recognizing the important contributions to the conference that could be made by the U.S.A., observers from that country attended and through them twelve of the fourteen working party reports were accompanied by a report on the same subject from a U.S. author or authors. In addition, other organizations, such as the World Health Organization and the Organization for Economic Co-operation and Development were also represented and made contributions to the discussions.

The participants, that is the official delegates named or appointed by their Governments and by the intergovern-

mental bodies, totalled 377. They represented 14 of the member countries of the Council of Europe: Austria, Belgium, Denmark, France, W. Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, Turkey and the United Kingdom. The largest contingents came from France (90), Germany (61) and Italy (78). The U.K. was content with 28. There were also 116 "observers", mostly from France and Germany.

It is relatively easy to criticize a conference for its shortcomings but more difficult to be positive about its value, which in any case may take time to become apparent. Perhaps the main value of this conference will prove to be that it was a stimulant to air pollution study and control that will benefit in particular the countries that have only recently become concerned about the problem, and that it will lead to closer co-operation that will be helpful to all, from scientists to administrators and educationists, who are working in the many branches of the subject. The conference forcefully emphasized how many branches there are, and a criticism of the event could be that it attempted to cover them all at once.

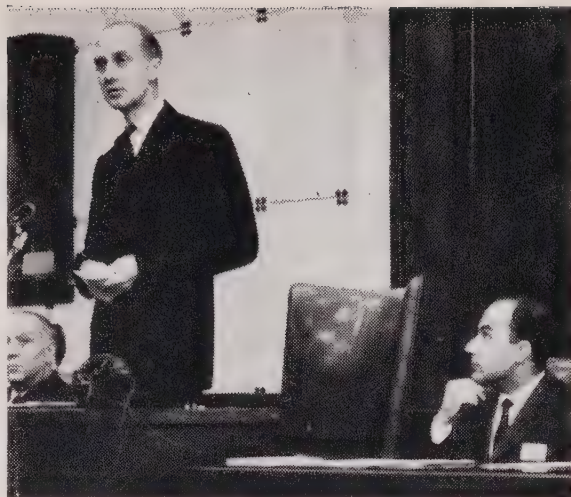
The fourteen separate sections into which the programme was divided meant a heavy weight of material to be prepared, digested and discussed, and it might have been better to have held two (or even three) shorter and more specialized meetings. Even with seven full working days the time available for discussion on some items was all too short—with only an hour, for example, devoted to the effects of pollution on human health, and only two sessions for all the technical problems of industrial pollution. The volume of information contained in

the fourteen reports, not to mention the (sometimes lengthier) supplementary reports from the U.S.A., was somewhat overwhelming for those whose interest is in the whole subject and is not confined to a specific aspect. It will be some time before the most important information and most fruitful ideas contained in the papers can be sifted and turned to advantage.

A word of tribute must be paid to the Council of Europe secretariat for the admirable way in which they tackled the organization of a conference (including the months of preparatory work by the working parties) which was of a nature that was inevitably novel to them. Many delegates appreciated the untiring and efficient efforts of Mr. Adinolfi, the principal organizer, and his small staff. They also welcomed the organization that made possible the publication each morning of summary reports, in French and English, of the previous days' discussions. All the documents were duplicated, which meant much bulk and weight—more than 25 lb. in fact. The delegates certainly, and perhaps also the secretariat, would have rejoiced if the documents could have been printed. There are many conferences held in the Maison de l'Europe for which printing facilities would surely be a boon.

Harmonization

One feature of the conference, helped by the very breadth of its scope, was the way in which it revealed what the different countries had in common in air pollution problems, and the ways in which the national situations differed, especially with respect to control. Behind all the discussions was a keen desire for co-operation, mutual assistance, exchange of information and, to use the word that aptly came up, for harmonization of activities. Differences in background, legislation, and even national constitutions, make any uniformity in law and administration quite impracticable, but there was a strong feeling that we could all go a long way towards harmonization.



Mr. Peter Smithers at the opening of the Conference. On the right is Mr. Adinolfi

In certain fields, largely in relation to the measurement and investigation of pollution and the establishment of common standards, the conference may have helped a great deal, and in the fields of legislation and control, stimulus was undoubtedly given to a drawing together, though not to any coalescence of organization. Of particular importance were proposals and discussion on "organization or development of European co-operation in research, standardization and documentation", with the possibility of a permanent body being set up by the Council of Europe, to act as a centre of such activities and for the exchange of information. There were differing views on this, because of the work already being done by other bodies and because it seemed to many that for some purposes a fully international and not a regional body was the most appropriate.

Thus it seemed to be generally accepted that much more international co-operation is necessary, and it is hoped that the Committee of Ministers will study the matter and make considered recommendations. Possibly either the Council of Europe could either set up an appropriate body itself, or it could initiate the formation of such a body, open to all nations, under the aegis, maybe, of the United Nations.

The Proceedings

As this journal is the only air pollution periodical to publish a regular international news section it should give as full a report as it can of what transpired during the conference. This is no easy task. There are the general reports, the U.S.A. reports, the discussions, the forty resolutions, and numerous points of other interest. In addition, the general reports are based on national reports which also contain much material of interest. To cover the ground, in the space at our disposal, means severe condensation.

First, though, reference should be made to the inaugural speech, by Sir Keith Joseph, U.K. Minister of Housing and Local Government. That he was invited to do this was a tribute to the pioneer work for clean air carried out in this country. He reviewed the action that had been taken, and the success achieved, in Great Britain over the past century, and concluded by urging the conference to examine arrangements for communicating information on technical progress. Science knew no frontiers, said Sir Keith, and it was essential that a problem that had been solved in one

corner of Europe should not still be the subject of research in another through ignorance of what had already been done. It was for the conference to decide whether action should be taken on an international or national basis.

During the conference other visits were made and short addresses were given by Ministers from other participating countries.

The opening session was presided over by the Secretary-General of the Council of Europe, Peter Smithers, formerly a British M.P., and following Sir Keith Joseph there was an introductory address by Dr. J. D. Cottrell, Deputy Director of the Regional Office for Europe of the World Health Organization, in which he stressed the health aspects of the problem and explained the role of WHO in its study.

Point 1. Effects of Pollution on Human Health

Wednesday, June 24, p.m.

Presented by Professor Petrilli (Italy), the general report first briefly reviewed what had been done, and what aspects were giving concern, in the different countries, and ended with a useful summary of research in progress. The main part of the report was a review of our knowledge of the epidemiological effects of air pollution, with division into the immediate or short-term effects, and the long-term effects including bronchitis and other respiratory complaints, and the question of lung cancer.

The American contribution on this item was by Dr. William S. Spicer, University of Maryland. It gave an account of respiratory disease surveys, acute and/or disaster episodes, cellular and biological effects, and studies with intact animals. It included also a list of nearly fifty references.

The chairman for the session was Dr. J. A. Scott, Medical Officer of Health, London County Council. There was an interesting and varied discussion to which Dr. Tesch (Netherlands), M. Delbruyere (Belgium), and



Dr. J. A. Scott (LCC—U.K.)

Dr. Martin (U.K.) made thoughtful contributions.

Point 2. Effects of Pollution on Animals and Plants

Wednesday, June 24, p.m.

This report, under the name of the working party chairman, Mr. Tendron of the Natural History Museum, Paris, was a full and capable document. It opened with a broad general survey of the subject and continued with an examination of the various general effects of air pollution on plants—through light, the atmosphere, water and soil—and the effects of specific pollutants. On the effects upon animals attention was naturally directed largely to fluorosis, but other specific pollutants were also considered. The report included a full list of references, as did the U.S. report, by Middleton and Emik, of the Air Pollution Research Centre, University of California. There was a long discussion—longer in fact than that on human health earlier in the afternoon—which showed the grave concern being felt in many countries over pollution that in many cases was apparently increasing.

Point 3. Economic Effects

Thursday, June 25, a.m.

With Dr. B. Wedin (Sweden) in the chair, a comparatively short report on the subject was presented by Professor Leclerc of Belgium. It reviewed such information as is available on the economic costs of air pollution and sought to include the costs borne in preventing air pollution as well as the costs due to the pollution. To attempt such a balance sheet clearly calls for much more research and statistical information, and the report concluded by recommending European action both in control and in the evaluation of the economic factors. It suggested that each country might select an economic expert to sit on a working party that would advise a European organization, preferably OECD (Organization for Economic Co-operation and Development).

The U.S. report, by S. Smith Griswold, Air Pollution Officer, Los Angeles County, was considerably longer than the working party's own report. It was a most interesting and detailed analysis, which in addition to the primary costs of air pollution dealt also with such aspects as the social costs and the philosophy that must lie behind a full review of the economics of air pollution. Once again, there was a useful discussion.

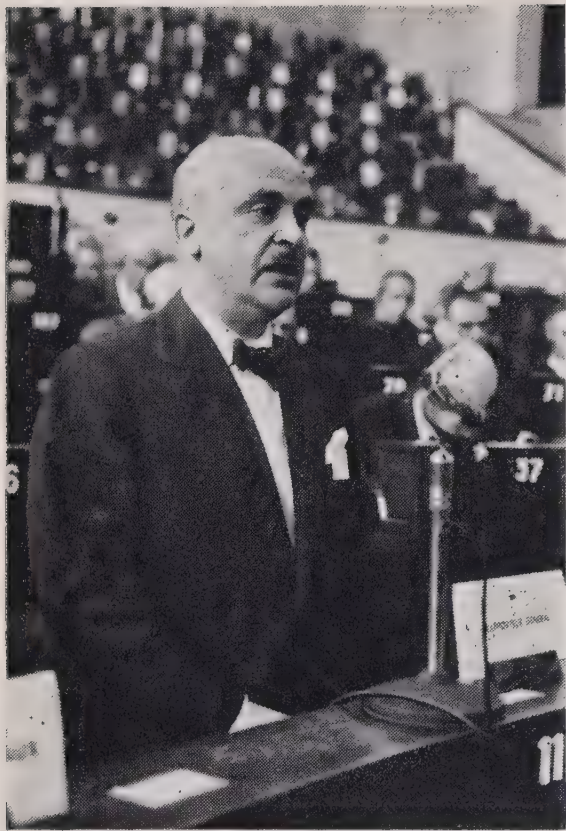
Point 4. Danger Thresholds

Thursday, June 25, p.m.

This detailed report was presented by Professor Truhaut of the University of Paris, whose 57 minute introduction was an oration notable for its exuberance as well as its length. The report stated that it had taken national reports into account, but it was clearly very largely Professor Truhaut's own inspiration. It is an important, detailed, and somewhat provocative document which fell into five sections: the nature of the risks; notes on the methodology for assessing the risks; the concept of maximum allowable concentrations applied to chemical air pollutants; the practical conclusions possible in the light of present toxicological knowledge on economic and social factors; and the scope for research and concerted action at European level.

The report was summed up as follows:

Our work on danger thresholds for chemical pollutants of the air in towns and industrial areas is still, for the most part, in the preliminary stage. We are therefore uncertain about the long-term effects that polluted air can have on human health. This uncertainty is particularly disquieting for toxicologists and health experts since emissions of certain pollutants have been found to be indubitably harmful, even in very small concentrations, so that in some countries at least legislation has been introduced to reduce them. It is therefore essential, in this branch of toxicology as in many others, to promote and assist research designed to bring to light the dangers present. A knowledge of the risks to which they are exposed is the first con-



Professor Petrilli (Italy)

dition for establishing measures to protect the health of people who, unfortunately, are not in a position to choose the air they breathe.

The report discussed MAC values in some detail and gave tables showing where U.S.A. and U.S.S.R. standards were either similar or divergent.

From the report and the discussion that followed it is apparent that many MAC figures may have value as rough and arbitrary guides, but no more.

In the discussion P. E. Joosting (Netherlands) said that the Dutch national report had composed only a small element in Professor Truhaut's report. He went on:

"In establishing MAC values it is necessary to take certain calculated risks which involve making choices. What qualitative basis should be used for setting a maximum allowable level of air pollution? What quantitative criterion is to be accepted? This last question raises the important question as to whether acceptable pollution levels should be based on the behaviour of

average people or on the needs of a susceptible minority?

The only acceptable criterion is that we must work for the survival of the *unfittest*. This would mean, for example, that as the incidence of air pollution seems to be worse during the winter there is a moral obligation on everybody to combat air pollution with greater vigour during the winter. It is immoral, in face of the evidence of increasing deaths due to lung cancer and respiratory illnesses, for us to accept that the less fit members of the community should be condemned to live in a polluted atmosphere."

Professor Neumann (Germany) emphasized that all MAC figures should be tentative and he regretted that Professor Truhaut had not dealt sufficiently with the need to consider inter-action between different substances discharged into the atmosphere, the need for further study of which had been emphasized in the German report.

There was no U.S. report on this item, but Arthur Stern (Assistant Chief, Air Pollution Division, U.S. Public Health Service) spoke and said that in his country air quality standards were matters for individual adoption by States, and when adopted were legally enforceable. He emphasized that it would be wrong to wait for research to be completed before air quality criteria were laid down. They must select threshold values now for the protection of future generations.

Point 5. Terminology and Units of Measure

Point 6. Standardization of Measuring and Control Apparatus and Methods of Measuring

Thursday, June 25, p.m.

These two reports were taken together, and were introduced by Dr. S. R. Craxford of the Warren Spring Laboratory, with Professor Ducarne, University of Liège, in the Chair, and were discussed together.

With the first of these reports the conference was brought down to the very practical problems of communica-

tion in the field of air pollution between countries using different languages, in which some of the words used have special technical meanings which are not always easy to translate. Technical dictionaries may cover the general sciences but can rarely deal adequately with terms in more specialized fields. The working party had therefore drawn up a multi-lingual vocabulary in English, French, German and Italian of words peculiar to, or in common use in, air pollution work. This is included as an annexe to the report. It is a straight vocabulary and, perhaps extended, will be of considerable value to readers and translators.

In addition, a special glossary was prepared, and included as a second annexe, of terms in use in air pollution writing that cannot readily be translated from one language to another without error creeping in. One example may be given. The term "dust-fall" is defined (in English) as "particulate matter in the air which falls to the ground under the influence of gravity." The corresponding terms in French, German and Italian are, respectively, *retombees*, *niederschläger*, and *cadute di polvere*.

Finally, the report gives a table of terms of measurement, with proposed international units in the almost universal C.G.S. system. It is recognized that some different national units may still have to continue in use (mostly English!) and these are also given with conversion factors. (Is not this another example of our need to go over to the decimal and C.G.S. system?)

No doubt the glossary could also be extended, and if generally accepted might be printed with the vocabulary in permanent form. But even as it stands the report is a very useful and practical aid to international communication in air pollution.

The Point 6 report on standardization of measurements discussed particularly the working party on this subject set up by OECD in 1957. Their report is shortly to be published and will be in six sections. [This will be reviewed in due course in this journal.]



Mrs. Weatherley and Dr. Craxford (both Warren Spring, U.K.)

Dr. Craxford stated that the present advanced position in this work was due to OECD and he hoped that the conference would ask them to continue their work on methods and even to expand it.

There were parallel U.S. reports on these two items, on Terminology by Professor Rossano, University of Washington, Seattle, and on Standardization by Dr. Thomas, University of California (Agricultural Air Research Centre).

The report on terminology was in the main a listing of groups in the U.S. working in the air pollution field and seeking to secure standardization of nomenclature and methods. This paper is most useful for reference purposes and is revealing in showing how much work is in progress and how many organizations are taking part in it. The report on measurement was a full account of the sampling and measurement methods used in the U.S. for all kinds of pollutants. Again, a valuable source of detailed information.

There was an interesting discussion, mostly on the technical level, although a German delegate, Mr. Stribeck, a

member of the Bundestag, made a more general contribution, in which he urged more effective legal action, and went on:

"With regard to the cost I do not believe that the clean air cause should be handicapped on that account. Industry and anyone else polluting the air should be made financially responsible for the damage done as well as urged to keep the air clean. In cases where individual firms could not bear the cost, the State must give assistance; this might in some cases be done through an insurance scheme and by grants for the necessary equipment. Never should people be allowed to fall ill or die because money was not available to combat the risks to which they were exposed."

Point 7. Meteorological, Topographical and Geographical Factors Influencing Air Pollution

Thursday, June 25, p.m.

The report was presented by Dr. Eriksson, head of the Atmospheric Chemistry Section of the International Meteorology Institute, University of

Stockholm. The Chairman, Mr. Avy, Joint Director of the National Institute of Applied Chemical Research, Paris, stressed the importance of the subject and "the delicate problems of co-operation it raised".

Dr. Eriksson said his report was based on the answers to a questionnaire sent to the national rapporteurs —on the organization of research, the type of research being carried out, the application of accomplished research, and future work. He had been amazed by the number of institutions working in this field and went on:

"One matter of concern is the education of meteorologists working on the problems of air pollution. The general feeling is that for such meteorologists a broader training, including for instance work on the medical and chemical aspects of pollution, is required. Equally, it might be that doctors and chemists should have some training in the factors affecting the dispersion of pollutants, including meteorology. Even within a nation there were also language difficulties, which emphasized the need for a technical dictionary."



A group of U.K. delegates have a break. Left to right: Dr. B. Leadbeater (I.C.I.), Dr. A. E. Martin (Ministry of Health), Arnold Marsh (N.S.C.A.), Sir Philip Dingle (Town Clerk, Manchester), and C.P.F. North (Ministry of Transport)

He emphasized the need to study dispersion effects and the factors affecting deposition of pollutants. Another field of study was the background pollution—that is, the normal concentration of pollutants in rural areas.

In a written appendix to the report Mr. Poncelet (Belgium) stressed the importance of climatology, as distinct from meteorology, in the study of air pollution.

R. A. McCormick, U.S. Weather Bureau Research Station, had written the U.S. contribution, which was in the main an informative survey of the research and field work carried out on the dispersion of pollution and the forecasting of air pollution situations.

Point 8. Methods of Reducing Pollution Caused by Combustion (Domestic and Industrial)

Friday, June 26, a.m.

This major item, though given only one report and one discussion period, had two general rapporteurs. In the chair was M. Detrie (France), and the two reports were presented by German participants: that on domestic pollution by Dipl. Ing. Lenhart, and that on industrial pollution by Dr. Ing. Schwarz.

It is difficult to summarize either section, or the equally detailed U.S. report, which was by Charles W. Gruber, Air Pollution Control and Heating Engineer, Cincinnati. One feature of the domestic pollution report should be mentioned: in Britain we consider that the domestic pollution problem is far larger and more difficult than it is in other countries, where the open coal fire does not exist. This is true, but domestic pollution is clearly regarded in these other countries as a serious factor. Dr. Lenhart made the point that in a large city, even a 10 per cent contribution from domestic sources can make a serious difference to the whole, whereas in a village a 90 per cent contribution may be quite unimportant.

The report pointed out that:

“the U.K. may be said to be in an exceptional position being a highly industrialized country where the share of domestic fires in the total emission has been estimated at more than 50 per cent. This is probably due to the facts that longflame coals in open fireplaces are preferred with an efficiency reaching in most cases not even 30 per cent, and, also that single-family houses with one or two storeys predominate so that a great number of low chimneys are required.”

It was pointed out that in modern stoves efficiency is always above 70 per cent, and may be 80 per cent or more “with particularly good stoves”.

Reference was made to the problems associated with the heating of blocks of flats, district heating, etc., and to the greater use of gas and off-peak heat-store electricity now taking place in Europe.

European co-operation in this field was desirable, but could not take the form of uniform legal regulations, although in comparable cases similar measures might be taken. Only a few agencies doing research and development in domestic heating were in contact with each other, and it would be a good thing if co-operation could be carried out on a large scale. The report suggested that the Council of Europe could help by preparing a list of organizations and furthering exchange of information between them.

The section of the report concerned with industrial pollution, introduced by Dr. Schwarz, dealt with steam raising generally and with power stations in particular. It gave estimates of the pollution experienced in different countries, legal regulations, and the nature of the emissions and measures for their reduction—smoke, grit and sulphur dioxide. The difficulties of dealing with the last were discussed. Many references were made to the situation and the action that had been taken in the U.K. There was a final section on measurement techniques—non-continuous gas sampling, and continuous supervisory equipment. For the future, the report called for

more international co-operation.

The U.S. report, by Charles W. Gruber, dealt with the nature of the pollutants from combustion, general methods for their reduction, and control methods related to coal and to fuel oil combustion. There were also sections on natural gas, the control of waste incineration and the combustion of waste material for heat recovery.

Point 9. Methods of Reducing Polluted Air Caused by Internal Combustion Engines (Motor Vehicles)

Friday, June 26, p.m.

Presented by Professor Brunner (Switzerland) and M. Lemaigre (France), with M. Detrie (France) in the chair, this report dealt fully with the problem under the headings: organization of action to combat pollution from motor vehicles; studies and research, their organization and results; ways and means of reducing pollution; and legislation. There were also three appendices—a list of public and private European bodies concerned with air pollution, a bibliography, and recent French and Belgian legislation.*

The complementary U.S. report was by D. A. Jensen and J. R. Scanlin of the California Motor Vehicle Pollution Control Board—once more a detailed and up-to-date review of the considerable (and to the outsider sometimes confusing) amount of action and control taking place in America, and especially in California.

Both the general report and the American refer in the main to the pollution from the petrol-driven vehicle, with the pollution due to carbon monoxide, hydrocarbons, and oxides of nitrogen. The problem of the diesel vehicle is regarded as being much simpler: "The diesel should not smoke and if it does so, it is because the feed is incorrectly adjusted, sometimes deliberately so, it is badly tuned, badly maintained, again often deliberately, and frequently badly driven. It is not the engine which is to blame, but the owner or driver."

On the petrol engine, after reviewing "the considerable amount of work carried out at great expense in the United States over the last ten years," and the European work that the report had summarized, it is admitted "in all honesty" that nothing new has emerged, which clearly demonstrates the technical difficulties that have to be overcome. The report continues:

"It is also difficult from the psychological point of view because no solution can be satisfactory without the intelligent, voluntary participation of millions of vehicle users. Although a regulation may impose pollution limits upon a motor manufacturer who has the means of measuring it, the same is not true of the purchaser who can only be required to observe certain constructive rules and to maintain his engine correctly, both of which are very difficult to check."

On the other hand the U.S. report ends in optimism. It is expected that a solution of the problem will evolve. Three reasons are given: progress is already evident and will continue on a step-by-step basis; because of the "well proven technological record of American industry in resolving motor vehicle engineering problems over the last sixty years"; and because the public is demanding that air pollution from vehicles must go.

Point 10. Specific Industries

Saturday, June 27, a.m. and p.m.

The general report under this heading, with nearly one hundred pages, was the bulkiest of all. It was presented by Dr. Mahler (U.K.—Deputy Chief Alkali Inspector), and with it were reports on the specific industries that had been selected for study. Each of these had its own rapporteur who, and their subjects, were as follows:

Questions in common to the various industries (Mr. Gerlache, High Authority of the European Coal and Steel Community), Ferrous and Non-

* The Belgian legislation is new and is reported as a news item elsewhere in this issue.



Dr. Mahler (Dep. Chief Alkali Inspector, U.K.)

Ferrous Metals (Dr. Mahler), Cement Works (Dr. Kohler, Germany), Gas Works (Dr. Lent, Germany, and Professor Padovani, Italy), the Oil Industry (Professor Padovani) and Chemical Industries (M. Avy, France). Dr.-Ing. Schaff (Germany) was in the chair.

Simply to list the questions included in the reports, and to mention that they were all introduced and discussed during the two Saturday sessions with 4½ hours total sitting time, may suffice to show that the conference attempted to absorb and to digest a formidable amount of technical information and opinion in a very short time. The general report itself was based on national reports received from eight countries.

To attempt to summarize, or describe the mass of information included in these papers is not possible in our available space, but we may quote the general considerations that were listed by Mr. Gerlache in his introductory survey as having emerged from the information in the national

reports. These he said, were:

1. Even though certain countries made provision a comparatively long time ago for measures to combat air pollution, it was only quite recently, *i.e.* since the revival of economic activity after the last war, that pollution came to be considered as an urgent problem.

2. The nature of the problem is liable to rapid and drastic change as a result of the changes in production methods. An example of this is the way in which the problem of eliminating the red-brown smoke caused by the use of oxygen in the iron and steel industry varies according to the production method used.

The first requirement—in itself a difficult problem on account of the high cost of purification plant—is to make pollution prevention methods adaptable to changes in production methods. The problem has particularly serious implications for old factories which suffer, for example, from lack of space. All these aspects of the question are equally important since it is imperative to deal with them all effectively.

3. While each polluting industry raises its own problems, pollution in a given area presents a problem which needs to be treated as a whole.

The various pollutants do not simply accumulate; once in the atmosphere they react on one another, with the result that certain substances gradually change under the effects of oxygen, moisture, radiation or the presence of other substances. Measures to combat individual pollutants must, if they are to be fully effective, be designed with a view to the problem as a whole.

4. If pollution is not to be accepted as inevitable, it should not be combated simply by arresting dust and purifying smoke. It should first of all be prevented. This involves the use whenever possible of production methods which produce little or no gas, smoke or harmful dust, or at least minimize the harmfulness of these substances.

5. The air pollution problem cannot be solved without fully co-ordinated action by all sectors concerned with it, such as the appropriate industries, public health authorities, town and country planning, meteorological and agricultural authorities, and scientific bodies. It is in this way that the problem will be approached at the Strasbourg Conference.

Point 11. Town and Country Planning

Monday, June 29, a.m.

Both the general report on this subject, and the corresponding U.S. report, were most interesting documents. The first, prepared and presented by Mr. van Meurs (Netherlands) was a detailed review of the numerous factors in town and country planning that have a bearing on air pollution, while the U.S. report, by Oscar Sutermeister (U.S. Dept. of Health) was a full account of the planning organization and their activities in his country. Special attention was given to the principle of zoning, and its application.

Both reports agreed in saying that air pollution control planning measures were secondary to the reduction of existing pollution and the prevention of new. Planning could however make a substantial contribution to reducing the harmful effects of pollution that it was not yet possible to prevent.

Mr. van Meur's summary and conclusions made nineteen specific points, while an appendix in the form of a table of physical planning measures that could assist clean air contained 49 headings or items. These included such diverse matters as, to cite a few, limitation of housing and industrial building densities, green spaces and green belts, separation of motor and other traffic, closing streets for motor traffic, wider streets and roads, restricting building on traffic roads, closing factories, preservation of forests.

The chairman was Mr. Th. Muller (Switzerland) and during the discussion there were addresses by M. Pflimlin, President of the Consultative Assembly of the Council of Europe, and by M. Radius, Chairman of the Social Committee of the Consultative Assembly. There was a full and varied discussion on a topic that clearly aroused much interest. Unfortunately on this occasion there were no contributions from the U.K. delegation.

A number of Mr. van Meur's proposals were addressed to the Council of Europe, urging that body to make

recommendations to its constituent governments on town and country planning in relation to air pollution, to ask for reports and to transmit them to the other countries.

Point 12. Organization or Development of European Co-operation in Research, Standardization, and Documentation Concerning the Campaign against Air Pollution

Monday, June 29, p.m.

Throughout the conference the various reports and many contributions to the discussions had revealed the need for more co-operation, liaison, information exchange and co-ordination of activities between the participating countries. All this was brought into focus by the Point 12 report, which was presented by Professor Petrilli, and which was supplemented the following morning by proposals contained in the Point 13 report on information and education.

It was here that a difference of views became apparent—whether to further the co-operation that was called for through existing agencies or through a new agency to be set up by the Council of Europe.

Professor Petrilli's report reviewed the present situation in European co-operation by the World Health Organization (WHO), the Organization for Economic Co-operation and Development (OECD), the European Coal and Steel Community (ECSC) and the Economic Commission for Europe (ECE). It suggested that the spheres of activity in which co-operation was necessary were: (1) study and research; (2) standardization of methods; (3) documentation and information; and (4) legislation. The report urged that the Committee of Ministers of the Council of Europe should set up a small European Co-ordinating Committee of government representatives to discuss how the conference should be followed up, "after which it would help, step by step, to develop co-operation in the spheres of research, the standardization of measuring

methods and apparatus, information and legislation." He supported the idea of setting up a Council of Europe Information Centre.

The discussion centred round these and other suggestions. It included a contribution from Mr. Chossudovsky, a Russian representing the ECE, and by some interesting information by the one Turkish representative, Senator Ertug, a chest physician, who spoke of increased pollution in Ankara and a great increase in respiratory illness in that city in recent years.

Mr. Chossudovsky outlined the activities of ECE and some of its committees in relation to air pollution. The Council of Europe could claim much credit for convening the conference but it was his view that any future conference should include representation from all European countries and the U.S.A.

Mr. Stern (U.S.A.) said his only suggestion for improving the organization or development of European co-operation, etc., in the campaign against air pollution would be to leave out the word "European". Co-operation should be world-wide.

Mr. Shannon (U.K.—CEGB) said he was rapporteur for a ECE Committee on thermal power stations, which took air pollution into account. He urged that no new agencies should be created, except an international information centre within the Council of Europe of OECD.

Ir. Hartogensis (Netherlands) could not support the idea of a permanent office for air pollution under the Council of Europe. Such a body would be in competition with existing agencies. There were not enough qualified experts on the subject and they must be allowed to do original work and not merely indulge in co-ordinating.

Dr. Craxford (U.K.) agreed with Ir. Hartogensis and did not think a new organization was necessary. It would take years to get going and information was wanted *now*. His organization (Warren Spring) distributed information and this could be

extended, while with little extra effort other existing organizations could also undertake this work.

P. D. Coates (U.K.—Ministry of Housing and Local Government) said they would not be able to decide how best to follow up the results of the conference until they knew what those results were, in fact, going to be. This itself would not emerge until the Consultative Assembly had considered the conference record and until the Committee of Ministers had reached their decisions on the recommendations of the Assembly. There would be a lot for the Assembly and the Committee of Ministers to consider, particularly in view of the number of motions tabled, after the conference had completed its work. It appeared, therefore, if he understood the constitutional position aright, that it was a little premature for them to decide at this stage what to do next, as the very results of their conference were as yet unknown.

The U.S. contribution, which was written by Mr. Stern as Assistant Chief, Division of Air Pollution, U.S. Public Health Service, discussed first the organization and development of co-operation in air pollution research, standardization and documentation within the United States. Secondly, it reviewed U.S. participation in international air pollution activities.

Point 13. Information and Education

Tuesday, June 30, a.m.

This report brought before the conference the important task of creating a public opinion aware of the problems of air pollution and in favour of the measures necessary to solve them. Propaganda, publicity, education, all mean the communication of information to the public generally or to specific groups. The report was presented by M. Queret (France—Secretary-General, the Association for the Prevention of Air Pollution), with Ir. H. Eilers (Netherlands) in the chair.

The report began with listing and

describing the national bodies that are engaged in information and educational activities, and continued by discussing the direction of propaganda, the means for action and the part played by the State itself, by local authorities and others, in the various countries.

Under "methods" the various media for publicity were reviewed—press, radio and TV, exhibitions, lectures and discussions, symposia and congresses. Then followed a proposal for the setting up of "a permanent information and documentation centre to be set up within the framework of the Council of Europe". This proposal was parallel with, and indeed a part of, the proposals discussed under Point 12, and attracted similar support or objection.

There was a full and widely-ranging discussion. M. Detrie spoke of the dangers of hasty legislation that could not be enforced. He has a refreshing sense of humour and put forward what he called a miraculous solution for the exhaust fumes problem—the exhaust should be at the front and under the driver's nose. This would lead either to the purification of the fumes, or, if they were really toxic, to their complete elimination by the elimination of drivers.

Dr. Wedin (Sweden) spoke of the need for international co-operation, for contacts to be made and for national and international information centres to co-ordinate studies. He suggested that the proposals made in both Points 12 and 13 should be carefully studied by an official committee representing the governments of member countries. This, he said, was also the view of his colleagues in the Swedish, Norwegian and Danish delegations.

The U.K. representative for Point 13, Arnold Marsh (N.S.C.A.), clarified a few references to Britain in the report and said he concurred with the principle of the proposals made for an information centre, but these should now be related to the wider proposals discussed under Point 12, and he



Y. Queret (A.P.P.A., France)

supported Dr. Wedin's suggestion that both sets of proposals should be studied by a Council of Europe committee. It was necessary, he suggested, to determine what international functions could best be performed by world-wide agencies; what best by regional agencies, among which the Council of Europe could be one; and what best by national agencies. "But", he continued, "we must take care not to spend more time and energy in organization, in conferences, in the writing of papers and so on, than we give to direct action against air pollution."

Speaking as editor of his Society's journal, the oldest periodical in the world concerned with air pollution, he said they already included a regular International Section. They would be glad to extend this, to make it bilingual if desired, and place it at the service of any international organization that might emerge from this or any other conference until such time as that organization was ready and able to launch its own publication.

Point 14. Comparison of National Laws and Regulations, Possibility of Standardizing these and drawing up Technical and Legislative Agreements and European Conventions on Air Pollution

Tuesday, June 30, p.m.

This ambitious subject was presented by Professor Högger (Switzerland) whose report, and the subsequent discussion, revealed the considerable differences in the present approach to legislation in the participating countries. Not only are there differences in thought about the form and nature control methods might take, but there are also wide differences in the constitutional foundations on which clean air law can be built up.

The report dealt with the general principles of legislation and the limitation of emissions; considered how far clean air requirements should go; and discussed special provisions under the three headings of industry, domestic, and motor vehicles. Sections on the application of regulations and on European co-operation were also considered.

This must have been an extremely difficult report to prepare, and inevitably it was controversial. Perhaps it can best be summed up by quoting Mr. Coates's frankly expressed contribution to the discussion. He said he:

“disagreed with some previous speakers; in his opinion the report was neither too precise nor too vague; it was just about right. The working party of which he had been a member had failed to reach agreement, and Professor Högger's report was therefore a personal one and did not express an agreed view.

In the opinion of the United Kingdom delegation, the report struck a happy medium between utopian generalities and unrealistically details for universal uniformity. The main body of the report was a masterly piece of synthesis. While he might have certain reservations about toxicity pressure values, in his opinion the conclusions were broadly right. The report indicated the broad principles on which a member State should base

its legislation and indicated in general terms the enforcement and measuring methods required by such legislation. This was worth doing.

The national reports taken together also provided a valuable symposium of information on legislation on this topic. These and Professor Högger's report were of great value to the conference.”

M. Detrie's view was that Professor Högger “had succeeded in reconciling the conflicting requirements of those who wished to impose the same anti-pollution measures on all industries and on those who wanted to avoid imposing useless measures on enterprises that were unlikely to pollute their surroundings”.

The session, presided over by Ministerialdirektor J. Berg (Germany—Ministry of Public Health) opened with an address by M. Querrin, Director of Architecture at the Ministry of Cultural Affairs, France, who was representing his Minister, M. Andre Malraux.

Following this session the conference considered the motions that had been submitted. This task was concluded on the Wednesday morning, when the conference was concluded with addresses from Arthur C. Stern, Rene Radius, and Henri Moureu, the Director of the Municipal Laboratory of Paris.

Homes near Food Factory Banned

Omagh Rural Council has been refused permission to build 64 houses close to the factory of Nestle's Food Products Ltd.

At a planning appeal by the council against Tyrone County Council's refusal of permission, it was said that the houses would be a hazard to the “maintenance of established standards of quality and hygiene due to atmospheric pollution from solid-fuel-burning appliances and the burning of rubbish and other wastes.”

The Ministry's inspector said there did not appear to be any reason which would justify the use at the present time of the site.

—*Belfast Telegraph*

More International News

Netherlands

A STUDY OF AIR POLLUTION AND HEALTH IN GELEEN

from Ir. L. J. Brasser,

Chief of Division of Air Pollution, Research Institute for Public Health Engineering, TNO

During 1959, 1960 and 1961 the air pollution and the public health in the mining town of Geleen were studied by the Research Institute for Public Health Engineering—TNO. (RIPHE—TNO.)

Now a report on this subject, entitled "Air Pollution and Health in Geleen" by Ir. L. J. Brasser and P. E. Joosting has been published by the RIPHE—TNO.

Geleen, which is situated in Limburg, the south-easterly province of the Netherlands, has a population of about 30,000. There is a large coal mine with coke works in the town, while a large group of chemical industries is situated in the western outskirts.

Air pollution from the works caused nuisance and damaged vegetation. The question arose whether this pollution might be detrimental to health. This was one of the reasons for the measurements made by RIPHE—TNO in close co-operation with the industries, the municipal authorities and the local general practitioners.

A total of about 10,000 measurements was made using standard deposit gauges, Liège spheres, automatic filter apparatus, transportable sulphur dioxide meters, washing bottles and impingers. Substances measured were, among others, dustfall, suspended dust, sulphur dioxide, nitrogen dioxide and hydrogen fluoride.

During the periods the measurements were made, the local general practitioners recorded all findings in practice, these findings (about 30,000

notes) being analysed by RIPHE—TNO.

It was possible to locate the principal industrial sources of a number of pollutants, it was proved also that domestic pollution was very important as far as smoke and sulphur dioxide were concerned. Moreover, air pollution from neighbouring industrial towns was on many occasions carried by wind to Geleen. The principal pollutants in the town proved to be dust, stench, sulphur dioxide and nitrogen dioxide.

It was not possible to find a clear correlation between the measured concentrations of air pollution and the health of the inhabitants of the different parts of the town. This may be due to the fact the air in Geleen is only moderately polluted and that the pollution is distributed fairly even over the whole town. The use of a control group of people living in a clean atmosphere was difficult for different reasons.

The report (120 pages, 22 figures, 77 tables, written in Dutch) can be obtained from the RIPHE—TNO, The Hague, Netherlands.

Belgium

AIR POLLUTION BILL

A Bill to control air pollution was introduced into the Belgian Senate in 1963 and is continuing to be considered. The text was given as an appendix to the Strasbourg conference report on pollution from motor vehicles because pollution is so defined in the Bill that it will include road vehicle emissions.

The Bill provides for wide powers (in the name of the King) to "take all necessary action to prevent or combat air pollution". In particular, action may be taken to prohibit specific forms of pollution, to restrict or prohibit apparatus liable to produce pollution, and to make regulations.

Air pollution is defined in the second clause of the Bill as "any discharge into the air, from whatever source, of gaseous, liquid or solid substances, liable to affect human health, cause harm to animals or plants, or deteriorate property or the landscape".

Decrees made must be approved by the Public Health Council and be proposed by an appropriate Minister—the Transport Minister, for example, will be concerned with decrees affecting vehicles. The Minister concerned with public health shall co-ordinate action on measuring and analysing air pollution, carrying out research and informing the public on the problem. To the last clause is added the provision that "the task of informing the public, as provided for under 4 above, may be carried out on behalf of, and at the expense of the department by a private body approved for the purpose by the Minister responsible for public health".

Air pollution officers may be appointed to collect evidence, take samples, make inspections, and carry out tests. They may also provisionally prohibit the use of offending plant, putting a seal upon it in emergency. Penalties for illegal air pollution, offending against the regulations that are to be made, or refusing to permit inspection will be subject to penalties ranging from eight days' to six months' imprisonment, and fines from F26 to F5,000. (3s. 9d. to £36.)

New Zealand

INDUSTRIAL SMOKE CONTROL

Regulations for stricter control of industrial smoke have recently been approved by the New Zealand Government. The Minister of Health (Mr. D. N. McKay) said that the object was to facilitate industrial development in New Zealand without the problems of smog and polluted air. The regulations also met a demand, especially in Auckland and Christchurch, for some control over the discharge of smoke and noxious vapours. The immediate aim

of the regulations was co-operation between industry and local authorities in limiting air pollution. The general effect would be to make the emission of certain types of smoke in certain volumes in particular areas a nuisance under the Health Act. Such areas would be specified from time to time by notice in the Gazette, after an application by a local body.

When the regulations came into force in any area, there would be two periods of exemption from their provisions, the first absolute for one year and the second a temporary exemption of existing furnaces from the more onerous provisions for seven years, subject to certain conditions. The regulations would not apply to smoke from the chimneys of private homes, but they would cover smoke from ship's funnels, said Mr. McKay.

The targets were dense smoke as defined by scientific formula, smoke which had not been reasonably treated to minimize the quantity and effects of dust, grit, ash, sulphur oxides discharged into the atmosphere, and any products of incomplete combustion.

Major local authorities, several sections of the Manufacturers' Federation, the University of Canterbury, Auckland industrial laboratories and the Meteorological Service had been consulted before the regulations were drafted, said Mr. McKay. Few industrial fuel-burning plants would find it hard to comply with the regulations, he said. Those unable to do so immediately, would find the period of seven years to improve equipment adequate.

Giving practical effect to the regulations would, in the main, call for better supervision of fuel-using equipment. In many cases, this would mean savings in fuel and lead to a greater appreciation of the value of technical training of staff. "We shall now have a sound basis for dealing with a problem that must be taken in hand if it is not to be a blot on New Zealand's industrial progress and a menace to the health of the community," he said.—*New Zealand Press Association.*

U.S.A.

A.P.C.A. CONFERENCE AT HOUSTON, TEXAS

The 57th annual meeting of the Air Pollution Control Association took place June 21-25, 1964, in Houston, Texas. The papers presented and discussed covered again a very wide field and numbered 130. We have received from the Association a set of the papers as published, together with a complete set of abstracts. As before, we are listing below the titles and authors of a selection of the papers likely to be of most general interest to our readers. The papers, and the abstracts, will be available for reference in the Society's library, and photostat copies can be supplied by arrangement.

In the list following, the figures in brackets are the Association's own reference numbers.

Reflections and Projections in the Field of Automotive Exhaust. S. Smith Griswold, Air Pollution Control District, Los Angeles, Calif. (64-1).

Air Pollution Research. W. L. Faith, Consulting Chemical Engineer, San Marino, Calif. (64-2).

Reflections and Projections Concerning Health Effects. L. Greenburg, Albert Einstein College of Medicine, New York, N.Y. (64-4).

"Lurgi" Gravel Bed Filter, a New Approach to Gas Cleaning. H. L. Engelbrecht, Lurgi Apparatebau G.m.b.H., Frankfurt/Main, West Germany. (64-5).

A Comprehensive Study of Electrostatic Precipitation at High Temperatures and Pressures. C. C. Shale, U.S. Bureau of Mines, Morgantown, West Virginia. (64-8).

Emission Standards for the Control of Solid Particles, A New Approach by New Jersey. L. A. Winkelman, Public Service Electric and Gas, Newark, N.J., and W. A. Munroe, New Jersey State Department of Health, Trenton, N.J. (64-15).

The New Federal Clean Air Act. V. G. MacKenzie, U.S. Public Health Service, Washington, D.C. (64-16).

SO₂ Scrubbing System for Air Pollution Control. W. C. Lawler, Olin-Mathieson

Chemicals Division, New York, N.Y. (64-25).

Materials Deterioration and Air Pollution. J. B. Upham, Air Pollution Division Health, Education and Welfare, Washington, D.C. (64-31).

Studies on the Carcinogenicity of Gasoline Engine Exhaust. D. Hoffman and E. L. Wynder, Sloan-Kettering Institute for Cancer Research, New York, N.Y. (64-53).

Health Aspects of Air Pollution. P. Gross, Industrial Hygiene Foundation, Pittsburgh, Pa. (64-56).

Experimental Studies of the Conditions of Exposure to Carcinogens for Lung Cancer Induction. U. Saffiotti, F. Cefis, L. H. Kolb and P. Shubik, Chicago Medical School, Chicago, Ill. (64-57).

Control of Motor Vehicle Emissions in California. D. A. Jenson, and E. P. Grant, Motor Vehicle Pollution Control Board, Los Angeles, California. (64-71).

Exhaust Control Devices. M. Patrick Sweeney, California Motor Vehicle Pollution Control Board, Los Angeles, Calif. (64-75).

Review of Recent Studies of Sulphur Oxides as Air Pollutants. M. D. Thomas, University of California, Riverside, Calif. (64-92).

Miscellaneous Air Pollutants and Their Effect on Agricultural Crops. H. M. Benedict, Stanford Research Institute, South Pasadena, Calif. (64-93).

Present Trends in Air Pollution Control Legislation. J. J. Schueneman, U.S. Public Health Service, Cincinnati, Ohio. (64-101).

Emissions of Polynuclear Hydrocarbons from Selected Industrial Processes. D. J. Von Lehmden, R. P. Hangebrauck, J. E. Meeker, U.S. Public Health Service, Cincinnati, Ohio. (64-116).

Evaluation of Vegetation Injury as an Air Pollution Criterion. M. Treshow, University of Utah, Salt Lake City, Utah. (64-125).

FURTHER SENATE REPORT

In our Winter 1963 issue (No. 128, p. 126) we reviewed the report of a Senatorial Inquiry on air pollution on the Bill which has now become the U.S. Clean Air Act (see Spring, 1964, No. 129, p. 223). The special subcommittee on air and water pollution,

again with Senator Edmund S. Muskie in the chair, has now held a series of technical hearings, of which we have received Part 2 of the report. This is a closely printed volume of 655 pages, containing the proceedings of the meetings and the statements, documents and other written material submitted by witnesses. In the words of Senator Muskie "the primary purpose of these hearings is to examine current information on some of the remaining technical problems in air pollution to help insure that we make real progress towards their solution".

The problems reviewed included automobiles, diesel engines, petroleum fuels, motor exhaust control devices, weapons and missile testing, jet aircraft, solid waste disposal and sulphur dioxide restriction.

There is a very large amount of technical information of all kinds packed into this report, which, with the earlier report mentioned above, makes it a valuable reference work. The hearings reported were held in June and July, and the printing and publication of such a book in so short a time is something of a feat by ordinary standards, though perhaps nothing out of the ordinary for the U.S. Government Printing Office.

MORE U.S.A. NEWS

from Arthur C. Stern
U.S. Public Health Service

FEDERAL GOVERNMENT TAKES TWO STEPS

The Federal Government has taken two steps designed to further the campaign for clean air.

For the first time, the Bureau of the Budget has included in its list of instructions for preparing annual budget estimates a provision for requesting additional funds for the installation of air and water pollution control and treatment systems. This means that Federal agencies and Departments can now ask for money for pollution control equipment for existing structures, or for facilities and buildings yet to be constructed.

In a second step, the President signed into law a Bill designed to assist in the development of mass transportation systems in urban areas. This Bill contains a provision requiring that air pollution control and prevention be taken into consideration before financial assistance to any project is provided.

Pollution from Motor Vehicles

Secretary of Health, Education and Welfare, Anthony J. Celebrezze has announced the formation of a joint government-industry committee to accelerate progress toward control of air pollution from motor vehicles. This committee was called for in the new Clean Air Act and gives the Department broad new authority in the area of air pollution control. In addition to directing the establishment of a technical committee, the Clean Air Act also calls on the Secretary to report to Congress this December and every six months thereafter on the entire subject of vehicular pollution.

Cleaner Air Week

A cleaner air week is being organized for the sixteenth year, during the week beginning October 25. Seventy-six population centres are participating in the campaign, which is sponsored by the Air Pollution Control Association.

P.R. for Clean Air Workers

The Air Pollution Control Association have published a new and revised edition of a useful little booklet "How to Tell the Air Pollution Control Story"—a public relations handbook. It covers, and gives hints on speaking, writing, press and radio or TV work, audio-visual aids, etc.

Georgetown University Study

A correlation between the size of soot particles and the increase of lung cancer was indicated in a study by Dr. Robert J. Coffey, Chairman of the Georgetown University Medical School Department of Survey, Washington, D.C. According to the study, the current reduction in the size of

soot particles may partially explain the great decrease in the incidence of stomach cancer and the concurrent rise in lung cancer, since smaller particles are believed to concentrate in the lungs, rather than stomach.

Air Pollution Damages Stone Art

A lengthy article in the *New York Times* has focussed attention here on the deterioration of much of the world's stone art heritage by air pollution. The great industrial surge of the past hundred years has so speeded the rate of decay that world-wide concern for the safety of much precious outdoor art is rapidly mounting. In Rome, the Coliseum, the Arch of Titus and many frescoes have been damaged. Florence superintendent of monuments Ugo Procacci described the situation there as disastrous. He said that the most serious cases of deterioration were at the Ponte Vecchio, the Pitti Palace, the Palazzo Strozzi and the basilica of San Lorenzo. Indeed, throughout Italy, many chapels and frescoes are decaying.

The article went on to describe similar conditions existing in Greece, France, Belgium, West Germany, Austria, Spain, England and the U.S.A. An English official said that the main causes of decay there were not only industrial fumes but also seaborne salt.

James J. Rorimer, director of the Metropolitan Museum of Art in New York City, said that he has received inquiries from almost every European country asking how to save stone. He says that "the first answer is that you put it indoors". In most instances, of course, such a remedy is impossible. A second solution is to wash the stone regularly, a rather expensive solution in the case of larger buildings and monuments. According to the article, except for water scrubbing, there is no generally acceptable method to prevent decay of outdoor stone.

Research to devise ways of preventing stone decay is now underway in the U.S.A. and abroad at the Con-

servation Centre of the New York University Institute of Fine Arts, the Building Research Centre at Garston, Watford, England, and several university laboratories in France. In 1958 U.N.E.S.C.O. created the International Centre for the Study of the Prevention and Restoration of Cultural Property, headquartered in Rome. Currently, the International Council of Museums, a branch of U.N.E.S.C.O., is conducting a world-wide survey of stone decay.

Exhaust Fume Control Unit Approved in California

The California Motor Vehicle Pollution Control Board have certified the smog control system developed by W. R. Grace and Co., and Norris-Thermador Corp.

The device, described as the first to meet emission standards established by the Board, is one of only four survivors of an original field of 38 which sought consideration, according to Grace.

This exhaust control system, once installed on a vehicle, requires only a simple annual catalyst replacement, according to the developers, and it is the only catalytic device approved by the Board containing a by-pass fail-safe mechanism.

Cost of the device to the new automobile manufacturer is \$35. Estimated annual cost to the consumer for catalyst replacement is \$24. The cost of catalyst replacement is considered less than the cost of annual engine tune-up.—*New York Journal of Commerce*.

School Chart

Through Educational Productions Ltd. the Society is shortly issuing a Clean Air Pictorial Chart for use in schools, with a booklet of notes on the subject for teachers. Particulars will be sent on request. It is hoped that local authority members will help to make the chart known to schools in their areas.

SMOKE CONTROL AREAS

Progress Report

POSITION TO JULY 1, 1964—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,388	41
<i>Acres</i>	305,705	12,566
<i>Premises</i>	1,642,125	95,212
Smoke Control Orders		
Confirmed	168	11
Submitted	113	5
Grand Totals	1,713	58

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Summer, 1964), which gave the position up to April 1, 1964. They now show the changes and additions to July 1, 1964.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing, but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control Areas in Operation

Batley B. No. 3, *Beeston & Stapleford U.D. No. 3, Billingham U.D. No. 2, Bingley U.D. Nos. 7 to 9, Birmingham C.B. Nos. 83, 96 to 101, Blackburn R.D. No. 1, Brentford & Chiswick B. No. 4, *Burnley C.B. No. 2, *Chadderton U.D. No. 5, Chesterfield R.D. No. 4, Chislehurst & Sidcup U.D. No. 1, Crayford U.D. No. 2, Croydon C.B. No. 5, *Derby C.B. No. 3, *Dukinfield B. No. 4, Ealing B. No. 14, Eccles B. No. 5, Grantham B. No. 7, Hackney M.B. No. 7, Halesowen

B. Nos. 20 and 21, Hammersmith M.B. No. 5, Hampstead M.B. No. 6, Harrow B. No. 7, Hayes & Harlington U.D. No. 22, Hendon B. No. 7, *Ilford B. No. 5, Keighley B. Nos. 2 and 3, Kidsgrove U.D. Nos. 1 to 7, Lambeth M.B. No. 3, Leeds C.B. Nos. 24 to 39, Lewisham M.B. Nos. 14 and 15, Liverpool C.B. Nos. 14 and 15 *Liverpool C.B. No. 16, Manchester C.B. No. 8, Morley B. Nos. 25 to 27, Ossett B. Nos. 6 and 7, Paddington M.B. No. 5, Poplar M.B. No. 15, Preston C.B. No. 7, Pudsey B. No. 4, Rothwell U.D. Nos. 3 to 6, Scunthorpe B. No. 4, *Sedgley U.D. No. 8, Southall B. No. 5, Spenborough B. No. 4, Staines U.D. No. 4, Stoke-on-Trent C.B. No. 13, Stourbridge B. No. 18, Sutton Coldfield B. No. 1, Swinton U.D. Nos. 2 to 5, Tipton B. No. 1, Wallasey C.B. No. 7, Walsall C.B. Nos. 5, 6 and 8, *Walsall C.B. No. 7, Walthamstow B. Nos. 6 and 7, Wath-upon-Deane U.D. No. 2, *Wetherby R.D. No. 1, Willenhall U.D. No. 15, Wimbledon B. No. 2.

New Orders Confirmed but not yet in Operation

Acton B. No. 9, Barking B. No. 8, *Bedford B. Nos. 2 and 3, Bethnal Green M.B. No. 4, Bingley U.D. No. 10, Birmingham C.B. Nos. 102 to 106, Bromley B. No. 6, Bury C.B. No. 4, Castleford B. No. 1, Chingford B. No. 4, Coventry C.B. No. 6, *Edmonton B. No.

6, Hammersmith M.B. No. 6, Harrow B. No. 8, Hornsey B. No. 6, Leicester C.B. No. 13, Reading C.B. No. 9, Sheffield C.B. No. 14, Southall B. No. 6, Staines U.D. No. 5, Sutton Coldfield B. No. 3, Todmorden B. No. 3, Whickham U.D. Nos. 2 and 3, Yiewsley & West Drayton U.D. Nos. 6 and 7.

New Orders Submitted for Confirmation but not yet Confirmed

Battersea M.B. No. 4, Blackburn C.B. No. 5, Brighouse B. No. 9, Chelsea M.B. No. 3, Cheshunt U.D. No. 4, Crewe B. No. 3, Derby C.B. No. 6, Ealing B. No. 18, Halifax C.B. No. 8, Hendon B. No. 11, Horsforth U.D. Nos. 14, 17 to 19, Huddersfield C.B. No. 9, Lambeth M.B. No. 12, Leeds C.B. Nos. 42 to 48, Malden & Coombe B. No. 6, Newcastle-upon-Tyne C.B. No. 12, Oldham C.B. No. 6, Oxford C.B. No. 4, Rothwell (Yorks.) U.D. No. 7, Salford C.B. No. 10, Sheffield

C.B. No. 5, Slough B. No. 7, Sowerby Bridge U.D. No. 1, Spensborough B. No. 6, Stetford B. No. 6, Stourbridge B. No. 20, Swinton U.D. No. 6, Thurrock U.D. No. 3, Tottenham B. No. 5, Wandsworth M.B. No. 7, West Hartlepool C.B. No. 2.

SCOTLAND

New Smoke Control Orders in Operation

*Falkirk No. 3, *Stirling County (Bannockburn No. 1).

New Smoke Control Orders Confirmed but not yet in Operation

*Glasgow (Craigton), Midlothian County (Livingston No. 1), *Paisley (Gallowhill).

New Smoke Control Order Submitted but not yet Confirmed

Lanark County (Burnside, etc.).

NEW GAS APPLIANCES TESTING DIVISION

There can be little doubt that the Gas Council is committed to a vigorous policy of expansion. This is reflected in the remarkable increase in the sales of gas roomheaters and other appliances.

Such a trend brings in its wake the need to safeguard the consumer's interests and the Gas Council is matching its zeal to promote the use of gas appliances with a realization that all such appliances should conform to a very high standard of operational efficiency.

In the 1920's the Gas Industry was testing appliances and reporting on its findings long before consumer protection became fashionable and on July 13 last, Sir Henry Jones, M.B.E., Chairman of the Gas Council, reminded a large audience assembled at Watson House for a Press viewing of the new Appliance Testing Division that the Seal of Approval given to tested appliances will grow in importance with the increase in the number of independent outlets for gas appliances anticipated in the future.

Sir Henry emphasized that perform-

ance and safety were the mutual concerns of the Gas Council and the manufacturer. Both were covered in great detail in the British Standards on which Watson House testing was based. Not only was exhaustive testing practised but emphasis was placed on the vitally important factor of quality control of assembly line production—carried out in the factories of the manufacturers. In this way minor faults and defects occurring in production could be put right before the appliance reached the consumer.

Evidence that the public appreciate the trouble taken to control the quality and efficiency of gas appliances is the result of a recent Gallup Poll. This revealed that the vast majority of those who use gas appliances are very satisfied as regards service, the quality of work done and charges made.

The Gas Council and the Society of British Gas Industries have established a new consultative body known as the Joint Approval Committee. In 1963/64, 266 appliances and modified appliances were tested and approved—eloquent testimony to the rapid growth of an industry which is now supplying over two million appliances a year.

CIRCULAR 69/63

Mr. Coates at London Meeting

At a meeting of the London and Home Counties Clean Air Advisory Council, in the House of Lords on February 14 last, Mr. P. D. Coates, Assistant Secretary, Ministry of Housing and Local Government, spoke on the Circular and the White Paper on "Domestic Fuel Supplies and the Clean Air Policy". Following is the report of his address, and the questions and answers that followed, as issued by the Advisory Council.

MR. COATES said that he was extremely grateful for this further opportunity of meeting the Council. The views of the members of the Council present would be particularly valuable to him in view of the very recent issue of the circular. The Department thought that the circular provided a satisfactory framework for continued progress with smoke control in the new conditions but were aware that by no means all the problems arising had been dealt with in this first circular (for example, further guidance was necessary about the appliances to be put into new housing and about the grant position on thermal storage heaters). Apart from any such omissions, it might well be that there had been teething troubles in applying the new arrangements. He very much hoped that members of the Council present would let him have any comments on the circular as well as putting to him questions arising out of it, and in particular would let him know any directions in which they thought further action by his Department would be helpful.

The basic position had not altered. Smoke control had not become any less important, nor had it become any less practicable to proceed with smoke control, although the cost of it to the householder, the local authority and the Exchequer would necessarily go up. There were plenty of smokeless fuels.

But the new arrangements might well have to be "sold" afresh to the public. Meanwhile it should not be forgotten that the changes in the expected availability of smokeless fuels had distinct compensations from the clean air point of view as well as certain disadvantages. Cheaper methods of producing gas and increased use of gas was all to the good, and because stoves used fuel so much more efficiently than open fires the increased installation of stoves would reduce the emission of sulphur compounds.

Mr. Coates then answered a number of questions.

As regarded the long-term availability of hard coke, Mr. Coates said that under the revised grant arrangements the total investment, including the Exchequer contribution, in installing appliances burning hard coke could over the coming years be very substantial. Detailed questions on fuel supplies were for the Ministry of Power to answer, but the short answer was that the conclusions reached about hard coke supplies in the White Paper "Domestic Fuel Supplies and the Clean Air Policy" were regarded as justifying this investment.

The future cost of smoke control would obviously be considerably greater. It would cost the local authorities more and it would cost the Exchequer more. An increase in the rate of the Exchequer contribution was unlikely but a substantial increase in the amount of the Exchequer contribution payable in respect of any given smoke control area had been accepted as inevitable. Although the capital cost of conversions to householders would in general be higher, householders were likely to be replacing less efficient and less convenient appliances with more efficient and more convenient ones, the running cost of some of which could be markedly lower.

Openable stoves (now styled "room-heaters") were relatively expensive appliances in the glossy magazine class. The householder who was able to install one with the aid of a 70 per cent grant was getting a bargain. Initially a push might be needed to "sell" the idea of stoves to people who were not used to them, but the indications were that (as was only to be expected) after a period of initial hesitation the virtues of stoves—low running costs, efficient and constant level of heating, cleanness, labour saving—caught on rapidly in smoke control areas. Stoves might be found particularly well suited to the needs of some elderly people. It was not thought likely that the manufacturers would have difficulty in expanding production to meet excreased demand. A closed stove might possibly have too high a heat output for very small rooms, but the technical advice was that even when run closed the smaller openable stoves could be used in very small rooms without overheating them, provided that the air supply was so regulated as to prevent too high a burning rate. The details of stoves suitable for various room sizes given in the Approved List of Domestic Solid Fuel Appliances showed *maximum* capacities; when fuel was burnt at slower rates the appliances could be used in smaller rooms. Rooms which were literally too small to permit heating by room-heaters were thought to be quite exceptional. In such cases, the householder might consider using a small electric thermal storage heater (say 1–1½ KW), an oil or a gas fire, a hot water radiator off a fire in the main room or kitchen, or an underfloor draught fire.

A technical leaflet had recently been issued by the Electricity Council about electric thermal storage heaters and another very detailed and informative one on underfloor draught fires was about to be issued by the British Coking Industry Association. These should be of assistance to local authorities.

As regards the revised grant arrangements, Mr. Coates said that the former

"broadly comparable" principle no longer held good in the new circumstances. Local authorities now had to relate their standards of what was reasonable to the type of appliances they were prepared to install in their own dwellings. It would not usually be "reasonably necessary" to install two thermal storage heaters in one room, but due regard had of course to be had to the size of the room. Complete freedom of choice should be given between underfloor draught fires and room heaters where solid fuel heating was desired, and the householder should be paid grant on the full "reasonably necessary" cost of whichever type of appliance was chosen. Where an existing solid fuel system also heated the water, for example where there was an open grate with back-boiler, it would be reasonable in normal circumstances to replace with, say, an openable stove with back-boiler, notwithstanding that an immersion heater was already installed. The provision of thermal insulation seemed to be an improvement rather than a replacement and expenditure on this could therefore hardly rank for grant.

As regards the building regulations to be made under Section 24 of the Clean Air Act, the Department appreciated the need for an early decision. It was proving difficult to devise a regulation that would fully meet all the requirements of the new situation, and it was of course essential to get the right answer. As soon as the likely requirements under the regulation were known it should be possible to give local authorities the guidance they needed about the types of appliances to be installed in any of their own new dwellings likely to be covered by smoke control orders in the future.

As regards the delivery of coal into smoke control areas, the first step was obviously for local authorities to make full use of the procedure indicated in Part II of Circular No. 7/63; if this failed to give satisfactory results in any particular instance the Department would be glad to have details.

Mr. Coates took note that the meet-

ing considered it considerably more urgent for the Department to revise the Question and Answer material in Circular No. 28/60 than to consolidate various circulars, etc., in a revised version of the Memorandum on Smoke Control Areas; and that smokeless solid fuel supplies for areas smoke controlled by way of tenancy agreement and not by way of smoke control order needed to be maintained.

He took note also of the view expressed that the advice being received from Gas Boards about fuel availabilities was not always sufficiently precise. On behalf of the Department he expressed his thanks for the many suggestions and comments made.

Gas Coke Supplies and Clean Air in London

Representatives of the Ministry of Power, the Ministry of Housing and Local Government, a Chief Public Health Inspector and Deputy Chief Public Health Inspector from two of the local authorities concerned, the Gas Coke Officers of the two Gas Boards, the Secretary of the London and Home Counties Coke Distributors Association and the Secretary of the London and Home Counties Clean Air Advisory Council, met in the Ministry of Power on May 11 to discuss the difficulties encountered by some local authorities in London on the application of paragraph 19 of Ministry of Housing and Local Government Circular 69/63 in the light of the replies they had received from the North Thames or South Eastern Gas Board regarding availability of gas coke for proposed smoke control orders. The Eastern Gas Board has since been consulted and will adhere to the agreement reported below.

On the one hand the local authority officers explained that without a clear "Yes" or "No" to their estimated requirements for gas coke for any given smoke control area, they were

unable to formulate a course of action under paragraph 19 of the circular, which relates to grant on the replacement or installation of improved open grates. On the other hand, the Gas Boards explained that local authorities' estimates of gas coke requirements tended to prove much above the eventual consumption in any given smoke control area and that with diminishing coke production this made it much more difficult for the Boards to see the way ahead clearly enough and be definite in their advice about supplies for particular smoke control areas proposed.

After full discussion the Gas Boards agreed that gas coke supplies in London could be taken as adequate for

- (i) all existing improved open fires (whether now burning coke or not) in proposed smoke control areas, and
- (ii) all other householders in such areas who, under conditions of individual freedom of choice, wished to install improved open fires.

It was agreed that this assurance should enable local authorities to decide how to apply paragraph 19 in the areas concerned. It was, however, emphasized that maximum benefit and accurate forecasting could only be secured by the closest co-operation between local authorities and Gas Boards to increase the information available to them from the actual pattern of fuel consumption finally established in past cases.

Other points of interest to local authorities were made by the fuel suppliers and distributors, namely that in London (a) there were increasing difficulties in securing deliveries of solid fuels to upper storeys and they urged that local authorities should recommend alternative fuels in these circumstances, thus increasing the availability of the solid fuels for ground floor dwellings; (b) there were ample supplies of cokes suitable for closed and openable stoves, the use of which would relieve the open-fire coke position.

News from the Divisions

CONFERENCE AT ROTHESAY

THE Annual Conference of the Scottish Division was held in Rothesay on May 21 and 22 and was attended by 120 members with John W. W. Peyton, Parliamentary Secretary, Ministry of Power, as principal guest speaker. In opening the Conference Provost James McMillan offered the delegates unlimited quantities of the world's purest air but the pleasure of accepting it was marred by the grey mist and rain coming in from the sea.

Under the Chairmanship of Councillor William Monteith, Mr Peyton spoke on "Clean Air and Fuel Policy". At the outset he emphasized the benefits to be gained by a vigorous crusade for clean air and issued the warning "I am myself most concerned that progress should not be jeopardized by unwillingness to accept the facts of our general fuel situation and a too stolid adherence to assumptions which have grown less valid with the years, and to products which relative to other fuels will rise in cost and diminish in attraction". Mr. Peyton reiterated the facts about trends in the gas industry and emphasized that coke, at first the basis of the clean air policy, was now shortening in supply and likely to become much scarcer.

Continuing, he discussed the role of oil, electricity and gas and referred to the Government's endeavours to bring local authorities and the fuel industries closer together. This did not mean, he said, that his department were seeking to slide out of their responsibilities. It meant they were reluctant to set up a nationwide bureaucratic organization to do what the local authorities and the industries could do perfectly well themselves. He concluded with a reference to the progress being made towards clean air in Scottish cities. Glasgow would be mostly smoke free

by 1970 and Edinburgh and Dundee by 1975.

Mr. John Foreman then took the chair for a technical session devoted to the Balfour process for the production of smokeless fuel, by Dr. F. W. Lohrisch, who described the ideal solid smokeless fuel as being suitable for all existing fireplaces, that is to say it should be easily ignitable, it should give a good radiant heat and it should also be reasonable in price.

Dr. F. W. Lohrisch went on to describe the method of carbonizing coal in a moving descending fuel bed inside a vertical shaft in counter current to the flow of the heating gas. This had the great advantage that no back pressure built up, which would reduce the power consumption considerably. A great variety of coals with a certain swelling number can be used which would not be suitable in a retort for batch operation on a fuel bed. The Balfour process was a continuous method and consisted of a vertical shaft with the coal filling moving in a downward direction. The upper portion of this shaft represented pre-heating and carbonization zone and the lower part the cooling zone. The heating gas was introduced above the cooling zone into the shaft and passed upward through the carbonization and pre-heating zone in counter current to the coal filling. At the same time, cooling gas was passed upward through the cooling zone in order to cool the produced hot smokeless fuel. The cooling gas was thus heated up and mixed with heating gas to support carbonization. Owing to the distillation of gas extracted from the coal, the gas leaving the retort had a certain calorific value similar to producer gas. It would be burned, therefore, in a combustion chamber to produce the required heat and gas. The process

was self supporting and there was also a surplus gas available for other purposes. Gas leaving the continuous carbonization shaft is passed through a gas washer, condenser, detarrer, and is recirculated by a gas blower to the combustion chamber and cooling zone. The extraction of smokeless fuel and the coal charging device would operate completely automatically and the labour needed would therefore be very low.

Dr. Lohrisch stressed the virtues of the smokeless fuel produced, it did not cause any soot deposits inside chimneys, the heat radiation was about 30 per cent greater than that of ordinary coal, and normally it had a higher calorific value than the average coal on the market. Housewives using smokeless fuel very soon realized that the higher cost per hundredweight was well covered by these advantages. He thought that it should be possible to produce smokeless fuel in the Balfour plant at such a cost that the yearly heating expenses in a house should definitely not be higher in the long run than using ordinary coal. Thus the process would represent a very useful contribution in the field of future fuel production and would help to facilitate the introduction of the Clean Air Act in Scotland.

NORTH WEST

Members of the Divisional Council have recently visited the Baxi Works, Preston, where they were guests of the board of directors for lunch and the "Heatstore", Wigan, factory of the Central Wagon Company. Both visits enabled members to see every stage in the manufacture of two types of appliance likely to play a significant part in domestic clean air progress. Prior to the "Heatstore" visit over 200 members of the division were entertained to lunch by the North Western Electricity Board at the Brocket Arms Hotel, Wigan.

Mr. R. F. Richardson, Chairman of the Board, paid tribute to the progress made by the Society in the North West and referred to the role of the storage

heater. He emphasized that thermal storage heaters would always be provided with a daytime boost of power at two-thirds normal unit rate.

The Divisional Council met at Audenshaw on August 12 and a meeting on October 27 will be held in the Walker Art Gallery, Liverpool.

NORTH EAST

At Newcastle members of the Division were guests of the Northumberland and Durham Division of the National Coal Board on the occasion of their annual meeting on April 23. Following the meeting some 75 members travelled to the Monkton Coke Ovens at Jarrow-on-Tyne and watched all phases of production in the manufacture of "Sunbrite". Grading and despatch of the fuel was demonstrated. Members felt that the operation of these ovens for the exclusive production of hard coke would assure a long term supply of "Sunbrite" for the North East.

After the National Coal Board had entertained members to lunch at the Old Assembly Rooms, Mr. A. S. Bean, Marketing Director of the Division, outlined the efforts being made by the Board to meet all fuel requirements for smoke control development in the region. Then followed an address on "Group Heating for Town Centres with Solid Fuel" by Mr. E. S. Melburn, the Deputy Marketing Director. He emphasized that despite the high capital cost of well planned boiler houses, running costs would be very low indeed.

The meeting passed a resolution, for forwarding to the Ministry of Housing and Local Government, pointing out that atmospheric pollution should be regarded as a national problem and the financial burden of smoke control should therefore be borne nationally. The resolution also called for an increase from 40 per cent to 60 per cent in that portion of the grant payable by the Exchequer.

The annual elections resulted in Alderman B. N. Young being elected

Chairman with Councillor T. Prudham and Professor P. C. G. Isaac, Vice-Chairmen. Mr. L. Mair and Mr. F. Ireland were re-elected Hon. Secretary and Treasurer, and Hon. Auditor respectively.

EAST MIDLANDS

His Worship the Mayor of Mansfield, Councillor A. H. Bailey, extended a civic welcome to the East Midlands Division on the occasion of their meeting in the Civic Hall, Mansfield on March 11. An address entitled "Smoke Control" was given by Mr. P. D. Coates of the Ministry of Housing and Local Government to the 100 members present. A spirited questioning and discussion session followed. Members were guests of Mansfield Corporation for lunch at the Swan Hotel and for tea at the conclusion of the meeting.

A further meeting of the Division was held on April 16 at Peterborough. The Mayor, Councillor Carl E. Hall, a member of the Divisional Council, welcomed members and delegates assembled in the Reception Room of the Town Hall.

An address on "The Alkali Act and the 1958 Order Processes" was given by W. E. Grant, B.Sc., Ph.D., F.R.I.C., District Inspector, Alkali Works Inspectorate. He dealt with many of the processes which presented problems of atmospheric pollution in Aluminium Works, the Ceramic Industry, the Iron and Steel Trades and the Electricity Industry.

Following the moving of a vote of thanks to the Mayor and Corporation by Mr. T. Henry Turner, members visited the Eastfield Factory of F. Perkins Limited and made an extensive tour of what is the largest diesel engine factory in the world. Mr. T. A. Read, Director and Company Secretary, welcomed the party and made reference to the wholly unnecessary emission of diesel smoke from some road vehicles.

Visit to Rexco Plant

Members of the East Midlands

Division meeting at Edwinstow on July 9 were able to visit the works of Rexco Products Limited at the Thorsby Colliery, by invitation of the National Carbonizing Company Ltd. Small parties were formed and toured the extensive works where the solid smokeless fuel is produced. They were able to observe the use made of by-products in laboratory demonstrations and listen to an address by J. Kershaw, A.M.I.GasE., A.M.Inst.Fuel, entitled "How We Make Rexco Smokeless Coal". Mr. Kershaw explained that the coals mined in the Midlands produced better burning cokes than coals of other classifications although the reasons for the more reactive qualities in these cokes could not be stated with certainty. For the open fire, which showed every sign of being retained for a long time yet, fuels must be available which will ignite easily, which will produce a lively fire quickly after lighting or refuelling and will provide heat into the room efficiently and smokelessly. The Rexco process produced such a fuel and was made in retorts holding about 35 tons of coal (within the size range 5 in. x 1 in.), much larger than gas works retorts or coke ovens, with a cylindrical firebrick lined steel cased vessel 25 ft. high and 10 ft. in diameter to hold this weight of coal. There was a charging opening at the top to receive the raw coal and a removable grate at the bottom for discharging the carbonized product. Connected to each retort was another cylindrical firebrick lined vessel—a combustion chamber in which the hot gases were produced to provide the heat for carbonization. This chamber was the same height as the retort but with a diameter of only 4½ ft., a gas burner with air blower was fitted at the bottom and a short cross-over piece at the top connected with the retort above the level of the coal charge.

The process, which was intermittent, worked on a cycle of about 18 hours. In the first seven hours sufficient hot combustion products were provided from the combustion chamber to carbonize the top two-thirds of the

coal charge. The gas and air supplies to the combustion chamber were then shut off and hot gas admission ceased. Cold, unburned gas was admitted to the retort and this passed downwards through the charge in the same manner. This unburned gas transferred sensible heat from the hot part of the fuel bed to the lower section of the retort which contained only partially carbonized coal. There was sufficient heat transfer to complete carbonization and the circulating gas finally reduced the average temperature of the Rexco to about 100°C. when it was then cool enough to be discharged. The crude gaseous products of the process are taken away from the bottom of each retort and passed in sequence through the wash box tar extractor and exhauster. The outlets of the latter are connected into a common main. The mixed gas in this main went forward through a washer for final removal of tar and ammonia vapours and was then clean enough for returning to the retort combustion chambers or into the surplus gas main.

The 21 retorts at the Rexco plant could handle over 1,000 tons of coal per day which made about 750 tons of the smokeless fuel. The first seven retorts were commissioned in 1957, a further seven retorts put to work in 1959 and the rest came into operation in 1963. Only well sized coal, free from slack, is used in the plant and prior to feeding into the retorts, the coal passes over other screens fitted with fine mesh to remove all coal below half-an-inch in size.

At the end of the carbonizing cycle, the retort is shut down and isolated from the remainder of the plant for discharge. The gas connection between the grate and its wash box is broken. The grate, which is the full diameter of the retort and runs on railed wheels, is withdrawn slowly by hydraulic power. Twenty-six tons of Rexco fall from the retort into a large discharge wharf below where re-ignition of the warm highly-reactive fuel is prevented by spraying with a small amount of water. The grate has a slotted steel surface to support the charge, and after

cleaning it is pushed back into position and the retort is then ready for receiving the next charge of coal.

A belt conveyor runs beneath the wharf and the carbonized product is run off and elevated to one of two screening plants where three main sizes of Rexco are produced to cater for open fires, closed appliances and commercial heating installations. As each retort is discharged, any gas dust, or steam is collected in a hood and carried along steel trunking to one of two washers. Clean water washes out all the dust and dirty vapours from the contaminated air which is drawn away from the retorts by means of a fan installed on the clean side of the washer. The outlet side of the fan discharges the washed air into the atmosphere.

Mr. Kershaw, explained that coal carbonizing plants could never be attractive things. He saw no chance of functionalism being allied to beauty, but he did see that during the past few years steady progress had been made in reducing the nuisance of atmospheric contamination. This was progress which must be measured against the present annual rate of production at Edwinstowe being almost twice what it was in 1962 and four times greater than the 1959 figure. It was a difficult job to apply dust and fume extraction equipment to a plant such as theirs but he thought that the weaknesses of the first attempt in tackling the problem had been overcome in the design of the 1963 installations. The earlier equipment was being modified to improve its performance. He concluded by expressing the hope that besides making a still better quality product it would be possible to build a plant which would be completely free of air pollution troubles.

After the meeting lunch was served at the Normanton Inn, Clumber Park, by invitation of the Rexco Company and Mr. J. A. Brown, the Company's General Manager, welcomed the guests and stated that £100,000 had recently been spent on efforts to prevent nuisance by emission of smoke and fume from the plant and further work



The Yorkshire Division at the works of E. Green and Son Ltd., Wakefield. In the front row, centre, is Col. S. Green, Managing Director, with (left) the Mayor of Morley and (right) the Mayor of Wakefield, on the other sides of whom are Mr. Saword, Chairman, and Mr. Goodfellow, Hon. Secretary of the Division

to cost £20,000 was now commencing.

The Annual General Meeting was held after lunch and after receiving the Honorary Secretary's report and financial statement the following officers were appointed: Chairman, Councillor Mrs. D. M. Ashley; Deputy Chairman, Mr. A. Murray; Honorary Secretary, Mr. Alfred Wade; Honorary Auditor, Mr. H. N. Eardley.

The Division held a meeting at Corby on Thursday, September 3, when a visit to Stewart & Lloyds, and a tour of the New Town took place.

YORKSHIRE

The 17th Annual General Meeting of the Division of the Society was held in the Civic Hall, Leeds, on Monday, March 16.

The Divisional Council held a meeting at the works of E. Green & Son Ltd., Wakefield, on Monday, June 8, 1964. The meeting was welcomed by Colonel Simon Green, the Managing Director. He said that clean air was really something we all wanted and every industrialist would like to see a clean atmosphere.

After the Chairman, Mr. A. C. Saword, Chief Public Health Inspector, Hull, had welcomed distinguished visitors, the business of the Division was concluded as expeditiously as possible so that the new Gas Council film "Most Precious Gift" could be

viewed. After an excellent buffet lunch provided by the company, Colonel Green again addressed the meeting and welcomed Alderman J. Marsh, Mayor of Wakefield, and Alderman A. Brewster, Mayor of Morley, before the members undertook an extensive tour of the works. The company were making the Paraclone Dust Collector, a multicyclone collector with cast iron cells to resist abrasion. This collector was being supplied to power stations where the existing collectors were not adequate to give the efficiency required. At the conclusion of the visit a hearty vote of thanks was given and Mr. Saword, the Chairman, said that whatever E. Green & Son did in the field of economizers, they certainly did not economize in their hospitality. The economizer, which was the company's oldest established product, was a very great help to clean air by helping to increase the efficiency of industrial plant which meant that there was less fuel burned and less smoke produced.

A further meeting of the Yorkshire Divisional Council was held at the Guildhall, Hull, on Thursday, July 9, members being the guests of the Lord Mayor of Hull (Alderman F. Hammond, J.P.) to lunch after the meeting. In the afternoon a visit to Messrs. Holitz Brothers took place to inspect the newly installed boiler plant burning wood waste.

‘Off-peak’ electric storage heating is officially recommended for future Smoke Control Areas

(See Ministry of Housing and Local Government Circular No. 69/63)

Electric storage heaters meet all the requirements of the Clean Air Act.

Cheap to install. For existing premises, Unit-plan storage heaters are ideal—all that is needed for installation is a simple wiring job. For buildings still at drawing-board stage, electric floor warming is the cheapest system of all—it is incorporated as an integral part of the structure.

Cheap to run. Electricity is available at ‘off-peak’ rates. The cost per unit may be as little as *one-half* the normal rate.

Clean and convenient. ‘Off-peak’ electricity provides today’s cleanest and most convenient form of heating. It complies *in every respect* with the requirements of the Clean Air Act.

Electric storage heating supports the Government’s intention of encouraging vigorous action against pollution of the air in our cities and towns. It can make important contributions to this policy.

Free leaflet entitled “When your neighbourhood becomes a Smoke Control Area . . . here’s how Electricity can help you”—written to advise and inform the public. Fill in and post this coupon now for one copy—bulk supplies obtainable through your Electricity Board.

To: Electrical Development Association (P/NTa)
2 Savoy Hill, London W.C.2.



Please send me a free copy of “When your neighbourhood becomes a Smoke Control Area . . . here’s how Electricity can help you”.

NAME.....

ADDRESS

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REASSURANCE ON SMOKELESS FUEL SUPPLIES

Local authorities which are delaying the implementation of Clean Air programmes because of fears of shortages of solid smokeless fuel supplies are misguided and mistaken, said Sir John Charrington, chairman of The National Federation of Coke Distributors' Associations, presiding at a one-day conference in London on July 7. The meeting was called to discuss the current and future availability of solid smokeless fuels and domestic solid fuel appliances.

Reviewing the supply position of solid smokeless fuels, Mr. Frank Wilkinson, Member for Marketing of the National Coal Board, referred to an increased demand for smokeless fuel—mainly premium open fire fuels and boiler fuels—of half a million tons a year. This was not confined to smoke control areas.

To meet this demand there were plans for the increased production of Coalite, Rexco, Cleanglow and Phimax, which should result in an additional 250,000 tons of these popular premium fuels during the coming year. Production of natural smokeless fuels—anthracite and Welsh dry steam coal—could be expected to increase by the same amount.

In addition, there would be a further 200,000 tons of Sunbrite available during the year and the cut-back in supplies of gas coke would be slower than had been anticipated.

Mr. Wilkinson emphasized that during the next two years he could foresee no overall shortage of solid smokeless fuels, although there might be some temporary local shortages of certain grades and types.

Taking a long-term view, there were plans now in operation for a higher production of natural smokeless fuels. Commercial plants for the N.C.B.'s new smokeless fuels "Homefire" and "Roomheat" would be in large-scale production by 1965 and future capa-

city would be increased to meet the demand.

Mr. H. V. Shelton, representing the British Ironfounders' Association, said the manufacturers had geared their production to producing sufficient appliances of the right type to meet the requirements of smoke control areas. The main trend, today, was for room heaters and it was hoped to exceed a target sale of 200,000 of these appliances in 1964.

Summing up the conference, Sir John Charrington said: "The surest way of preventing a future shortage of smokeless fuel will be the installation of the largest possible number of room heaters. It is clear there is no likelihood of any shortage of fuels suitable for this type of appliance".

Another Warning for the North

An address given by Professor R. E. Tunbridge of Leeds University to the Health Visitors' Association summer school at Oxford on July 6, received widespread press publicity. Although the address was devoted to the whole problem of health education his references to air pollution aroused the most comment, particularly a prediction that thousands of children, especially in the North of England, were being exposed to levels of atmospheric pollution which would cripple about a third of them before they reached the age of 50—a statement that was given many headlines.

He called for the abandonment of the coal fire, but could not regard oil fires as an acceptable alternative, and referred to smoke, soot and sulphur dioxide as a tremendous burden on society. In asking the question, "were we prepared to change our habits and foot the bill to combat air pollution?" Professor Tunbridge had of necessity to refer to the problem of domestic heating and said that less than 10 per cent of the 400,000 houses built annually were really "modern" from a heating point of view. He claimed that we could use all our sources of power centrally and that it would be economical to extract noxious fumes.

Stoke Orchard

Inspected

AN open day arranged by the National Coal Board at Stoke Orchard, Cheltenham on June 17 provided an opportunity for Lord Robens to make a characteristically vigorous speech in defence of the Board's intention to maintain a production figure of 200,000,000 tons of coal a year—and sell it, as he made unquestioningly clear!

Besides being an open day it was the occasion for a ceremonial tape cutting by Lord Robens to mark the official opening of a “research establishment that will find ways and means of putting coal to better use now that its recently added function as a test laboratory for solid fuel appliances is under way”.

Although Stoke Orchard began operations in 1948 and had new laboratories added in 1955 the large party, including members of the Press, attending the opening ceremony were left in no doubt regarding the greatly extended scope of operations to ensure that householders could select domestic appliances in the certain knowledge that exhaustive tests had been undertaken to guarantee their long life and efficiency.

A particularly interesting field being exploited was that of boilers and space heaters designed to burn high volatile coals smokelessly and at low cost, being used on “test beds” that measure smoke emission optically by the use of a photocell or by the stain made on a moving-strip filter paper from a stream sample. Heat output on these fuels, together with anthracite and an anthracite substitute (duff briquetted at high temperature with a binder) was being measured by the temperature rise in a constant flow of water as indicated by differential thermocouples



The Fuel and Appliance Testing Laboratory at Stoke Orchard

or, as on one boiler, by a direct-reading heat meter.

At a later stage it is intended that smoke measuring tests will be done gravimetrically by its collection on electrostatic precipitators, apparently on similar lines to the tests recently carried out at Leatherhead by B.C.U.R.A. and using equipment based on their design.

Literature distributed to the visitors at Stoke Orchard referred to the laboratory as a “proof of the National Coal Board's determination to keep solid fuels pre-eminent in the home and make them still more economical and convenient to use”, and everyone involved in the complex process of speeding up the implementation of the domestic aspects of the Clean Air Act will hope that nothing will sap this determination.

Lord Robens described the Laboratory as the most up-to-date in the world and its role as making sure that we burn coal more efficiently—surely a plea to make it smokeless, as in the same passage he referred to the new plant at Coventry “pouring out Homefire” and later referred to the production of anthracite ovoids commencing at the Crown Fuel Works,

Cardiff in 1965 with an estimated annual output of 120,000 tons annually. It was the intention of the NCB he said, to establish Divisional plants to manufacture the new smokeless fuels; gratifying news to be considered alongside the announcement that the Phurnacite plant had reached the limit of its productivity with an output of 800,000 tons annually.

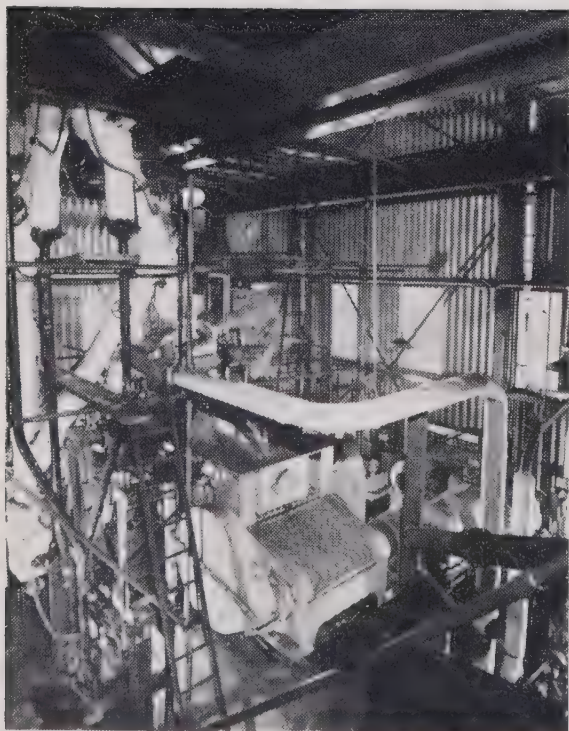
The needs of industry are also a concern of the laboratory. A study of the kinetics of coal carbonization—evaluating the effects on coal of carbonization processes carried out at varying temperatures and times. Collaboration is being undertaken with the Central Electricity Generating Board in an endeavour to improve electricity generation efficiency by use of gas turbine/steam cycle. Coal's contribution to this project is producing the gas required. Two systems are being considered—partial carbonization of coal in a fluidized bed and total gasification.

No report on Stoke Orchard would be complete without a reference to the encouraging spectacle of what is quite literally a battery of varied solid fuel

appliances burning away merrily on a diet of "Homefire" and "Roomheat"—those fuels of which so much is expected. In addition a new fuel, "Mild Heat Treatment" is being tested in closed stoves and boilers as well as the anthracite substitute already mentioned. Some of the appliances were new and still in the development stage. With these the emphasis is on modern amenities—the automatic disposal of ash to the outside of the home, minimizing labour and dust and perhaps most important of all the appliances to burn bituminous coal smokelessly and give the householder the benefit of fuel even cheaper than the present solid smokeless fuels which, on a basis of cost per heat unit, are already, it is claimed, more economical than their competitors.

Close collaboration is maintained with the appliance manufacturers and the Laboratory participates actively in the work of technical panels of the British Standards Institution.

Fuller technical details of Stoke Orchard can be obtained from the Society or direct from the National Coal Board, Hobart House, Grosvenor Place, London, S.W.1.



Experimental production of smokeless briquetted fuel for domestic purposes, with Kopperrn roll press ("Roomheat" process)

Chimney Height Problem in Bristol

Controversy is reported to have broken out about Bristol's planned new £2 million museum and art gallery. This is over the height of the stack which will carry fumes away from the central heating system.

City architect, Mr. Albert Clarke, said if the system used oil or solid fuel the stack would have to be 140 ft. to conform with the Clean Air Act. The top would then be 40 ft. above the roof.

But, Mr. Clarke admitted this was completely unacceptable to Sir Hugh Casson, master planner for Wine Street, and Mr. James Bennett, city planning officer.

On the other hand, a gas-fired boiler would add £4,000-£5,000 annually to the running costs and electricity would be even more expensive.

New Books

Gas Purification Processes. Edited by G. Nonhebel. 894 pp. George Newnes, London. £7 net.

This is probably the most comprehensive book ever published on the purification of gases. Edited by Dr. Gordon Nonhebel, it consists of nineteen chapters, covering every aspect of the subject, which have been contributed by 29 authors. The list of contributors makes a formidable array of the experts and specialists in their particular fields, and the collective volume is a most impressive work.

It is only necessary to quote the subjects of some of the chapters to show how completely the ground has been covered—gas absorbers, adsorption, catalytic methods, odour destruction, dust removal, electrostatic precipitation, cement, brass foundry and steel works, sampling and monitoring, air purification in buildings, gas absorbents for breathing apparatus, purification of air in nuclear-powered submarines, meteorological factors affecting chimney discharge, and heights of chimneys. Several of the chapters are by Nonhebel himself.

It is a book to be welcomed both for its scope and for the authority it is given by its authors. It is not a series of papers of mere generalized information and theory, and many of the authors give practical examples of real experience and applied know-how. Brought together in a single stout volume, such a book will be of value to both students and to those who are concerned with the practical application of the knowledge, whether they are technologists in industry, public health officers, or scientific workers.

Atmospheric Pollution: Its Origins and Prevention. A. R. Meetham, in collaboration with D. W. Bottom and S. Cayton. 3rd revised edition. 301 pp. Pergamon Press, Oxford. 70s. net.

For this revised edition of the book

first published in 1952 Dr. Meetham has had the collaboration of a Senior Lecturer in Public Health Inspection and a Chief Public Health Inspector. It has had new material added and revisions made to the original. The page size is rather larger than before and the paper and print improved, while the bibliographies that are given at the end of each chapter have been much extended and brought up-to-date—more up-to-date in some instances than the preceding text.

Perusal of the book, and comparison with the earlier editions, does however promote the question of whether it is really preferable, in dealing with a subject in which so much is happening, to seek to revise a work that has in part at least become out of date, or to start all over again. Deletions, additions and revisions are apt to leave a certain patchiness and perhaps also a loss of balance.

In this instance we find, for example, in discussion on the cost of air pollution (p. 240) that although the value of the fuel lost as smoke has been given as twice that given in the 1952 edition, the quantity of the smoke emitted annually is kept unchanged at the 1952 figure of 2.4 million tons. It has in fact fallen to 1.5 million tons.

Again, discussion on observations made in Hyde Park many years ago, from which too much was deduced on what would happen when a smokeless zone was established, is retained unaltered in the new edition, and it is still said that Hyde Park is a smokeless zone surrounded by smoke-producing areas. This of course is no longer true. It is an area largely surrounded by smokeless zones.

The index has been enlarged, but even so lacks references one happened to look for and expected to find—e.g., Beaver Committee (or Committee on Air Pollution), Diesel, and National Survey of Air Pollution. On the other hand the notes on the legal situation in other countries has been extended

and make a useful and concise source for reference.

The book, steering a course between the popular and the fully technical and comprehensive, has many merits that outweigh criticism of detail, and it will undoubtedly be helpful to and valued by many in the field of air pollution study.

WHO AIR POLLUTION REPORT

Atmospheric Pollutants: Report of a W.H.O. Expert Committee. World Health Organization: Technical Report Series, 1964, No. 271, 18 pp. Price: 1s. 9d., \$0.30, Sw.fr. 1. Also published in French and Spanish. Available through H.M. Stationery Office.

The problems created by air pollution were first considered by a W.H.O. Expert Committee in 1957. The present report reviews subsequent progress in air pollution control, defines urgent needs, and makes a number of recommendations for further action.

Considerable technical progress has been made in controlling air pollution, through measures to reduce emissions from motor vehicles and through such developments as: the smokeless combustion of coal in industrial furnaces; the production of reactive cokes for burning in open fires; increased use of natural gas, electricity and high-quality oil for heating, cooking and lighting; and generation of electricity by water power or nuclear energy. Many of the problems of air pollution, such as the control of emissions from motor vehicles and the elimination of sulphur dioxide from flue gases, are of international interest, and the Committee suggests that W.H.O. might give particular attention to these. Other problems of this type include the influence of meteorological conditions on air pollution, morbidity studies to assess the cost to the community of sickness caused or prolonged by air pollution, and the development of inexpensive methods

for the production of relatively smokeless fuels.

If international co-operation is to be fruitful, a particularly urgent need is to abolish from the technical literature imprecise terminology and to secure international agreement on nomenclature and methods of measurement. The Committee outlines the principles to be observed in collecting and describing air pollutants and emphasizes the importance of selecting sampling sites so that the samples taken are representative of the air actually breathed. It also endorses the views of the W.H.O. Inter-Regional Symposium on Criteria for Air Quality and Methods of Measurement, particularly in regard to the adoption of four levels of pollution, defined in terms of concentrations, exposure times and corresponding effects, and the desirability that W.H.O. should compile international guides to air quality embodying the principles enunciated by the Symposium. Other recommendations of the Committee relate to the necessity for studies by W.H.O. of the air pollution potential in various member countries and of the probable training requirements in countries where air pollution control has recently been started or is at present under consideration. Suggestions are also made for the dissemination by W.H.O. of information on air pollution and for facilitating the exchange of rare chemicals, spectroscopic standards, and measuring equipment among member countries. On information, one paragraph may be quoted in full:

“During the last six years various countries have begun to control air pollution in their cities. The control officials are still relatively inexperienced and therefore find it difficult to deal with all the technical problems they meet. The regular publication of articles dealing with specific aspects of air pollution control, outlining the technical problems that may be met, describing how to deal with them, and indicating where fuller technical literature on the subject can be obtained, would be a valuable international service.”

Air Pollution at Stockton

Parliamentary Discussion

AT 1.26 a.m. on July 29, Mr. W. T. Rodgers, member for Stockton-on-Tees, raised the matter of industrial air pollution on Tees-side—a problem which had concerned him for the 2½ years he had sat as member and his predecessor for a long time prior to that.

After conceding that the “cat-smell” (mesityloxiide re-acting with hydrogen sulphide) had been substantially dispersed on Tees-side he drew attention to what is popularly known as the “fish-smell”, a nuisance not confined to his constituency alone and one which had been a more persistent source of complaint in the constituency than any other issue. Mr. Rodgers described it as a matter of grave concern to his constituents and explained how atmospheric conditions caused Stockton to suffer most from it—wind direction, the notorious sea fret and an occasional temperature inversion conspired together to make the smell persist and hang over the town for considerable periods—more unpleasant than any other industrial smell known to the Hon. member, who referred at this point to his upbringing in the windward of a gasworks in Liverpool.

Mr. Rodgers, who spoke for almost half-an-hour, quoted from letters sent to him by constituents. One from a teacher complained of beautiful days being completely ruined by the haze and stinks over Portrack and the deleterious effects on his catarrhal cold. A worker in a nursery school had written to say that the only nice days of the year were spoiled by the horrible smell while a third letter claimed that the fumes were affecting children's health. Another constituent had been impelled to move out of the area.

He paid tribute to the publicity given to the matter in the *Northern Echo* (a newspaper with an honourable record of support for domestic clean

air). I.C.I., Billingham, had accepted responsibility for the smell and explained that it resulted from occasional leakages from the methylamines plant*.

The smell, continued Mr. Rodgers, had inspired a Middlesbrough man to write a song entitled “The fume de Tees”. It had concerned the Stockton Borough Council over the years and the Chairman of the Borough Health Committee had approached I.C.I. on the subject more persistently than anyone else. A letter from 39 consultants and general practitioners in Stockton emphasizing the irritant nature of industrial pollution of any kind to the respiratory system had been forwarded to the Joint Parliamentary Secretary of the Ministry of Housing and Local Government, who like Mr. Rodgers, agreed that much has been done on the level of amelioration.

The member made other references to the objectionable and pervasive aspects of the fish smell and ruminated on the possibilities of releasing a quantity of amine in the Chamber—a course of action hardly likely to clear the Chamber as the few members present were personally concerned in the matter and would be prepared to “stick it out”. He felt that there had been considerable complacency regarding the matter and a total lack of urgency on the part of the Department.

An abortive attempt to have a public meeting in the constituency to which the alkali inspector concerned could speak with Mr. Rodgers in the Chair, was next described to the

* I.C.I. have informed the Society of the elaborate precautions they have taken to eliminate this nuisance, welding pipelines and tanks wherever possible, carrying out three inspections a day to check small leaks and of care taken in loading drums and cylinders. Ultra violet lamps are placed around filling points to destroy amines vapour.

House and there was an exchange with Mr. F. V. Corfield (Joint Parliamentary Secretary) as to why this public meeting did not materialize. Mr. Rodgers stated that there had been a refusal to allow a Government official to communicate with the public and subsequent correspondence with the Department had been cliché-ridden both in terms of language and in tone.

Mr. Rodgers then requested more detailed information about the timetable during which progressive improvement of the situation could be expected or was he to be reconciled to a long period as member for Stockton-on-Tees during which a large part of his correspondence would be concerned with the problem. He called for frankness from the Joint Parliamentary Secretary even if such frankness were regarded with alarm by his constituents.

The achievement of amines control by the Alkali Inspectorate had been a very good way to celebrate the 100th anniversary of the first Alkali Act said the Hon. Member. He would now be satisfied if he were to be given a timetable to see when the job would be completed, but was worried about a phrase current in the terminology of the Alkali Inspectorate which could be used in almost any context. The phrase was "prudent tolerance"—the point at which one balances the needs of industry with the protection of the public. Prudent tolerance involved preventing the fish smell from continuing by dealing with the problem of amines, even if the cost is considerable.

He next exonerated I.C.I. of responsibility for the nuisance as it was their job to manufacture and sell, but it was the job of the Ministry to control and not expect that its simple moral authority would require a large private firm to do what might be in the best public interest. Was it true that the cost of control might be to price the product off the market, with very serious consequences for Britain's industrial output?

The part played by Stockton-on-Tees in pioneering the industrial revolution was stressed by Mr. Rod-

gers. There had been agreement in the House on the need to rehabilitate areas which pioneered the industrial revolution and now found themselves in circumstances of difficulty for which they were not responsible. If the Parliamentary Secretary wanted to help rehabilitate Tees-side and Stockton-on-Tees in particular he would deal with the very acute and most unpleasant problem of this specific atmospheric pollution.

Dr. Jeremy Bray (Middlesbrough West) requested information about the value of the product per annum from the plant concerned. What area of magnitude of loss to the country or to I.C.I. would result if production were to cease? he asked.

Mr. Charles Longbottom (York) spoke on the diminished pleasure of electioneering in Stockton-on-Tees in 1955 as a consequence of going around in a terrible haze and smell on several days and gave an assurance that the member for Stockton-on-Tees was in no way exaggerating when he said the summer days were spoilt by the haze and the smell was appalling. Even then, 10 years ago, I.C.I. was doing its best to diminish it. It continues to do so but it seemed to be an extraordinarily difficult problem. There was the will to overcome the smell without the means of doing so. He hoped that a "boffin" would come across with the answer sometime.

The Reply

Mr. F. V. Corfield (Joint Parliamentary Secretary to the Ministry of Housing and Local Government) in replying expressed gratitude to the Hon. Member for Stockton-on-Tees for the way he had raised the subject and said he appreciated that it was a very unpleasant smell, and that, coupled with the mist so very common in the area it did cause a very considerable problem and nuisance in his constituency.

The process involved only came into the Alkali Inspector's sphere in 1963

and considerable progress had already been made. He understood that I.C.I. started installing a new manufacturing unit in the summer of 1962 that would produce a very great improvement once teething troubles had been overcome. It was now working without any obvious faults. Although he could give no guarantee that the fish smell would not occur again he could tell the Hon. Member that the Alkali Inspectorate was making every effort to discover ways and means of improving the methods of prevention that would eventually eliminate the smell altogether. Throughout the Alkali Inspectorate's experience the I.C.I. had been very co-operative and had spent enormous sums of money on this problem. There was no question of having reached a point at which one says "It is not economic to go further". It is not a question of saying "We know what we can do to reach perfection, but it is not worth spending the money". It was a question of not knowing the technical answer at this stage.

Mr. Corfield next referred to the role of the Tees-side mists in trapping a lot of the emissions, which in turn slowed down the dispersion of the mists. In the vast concentration of industry that prevailed in the area small emissions from a number of plants could add up to a considerable degree of pollution when suspended in the mist. The D.S.I.R. was undertaking research into the problem and there was no complacency on the part of the Inspectorate whose staff had worked hard and enthusiastically and enjoyed the utmost co-operation from the industrialists in the area.

Mr. Corfield concluded his remarks with a reference to the contributory role of domestic smoke to the problem. He hoped that Stockton-on-Tees would press on with smoke control and that a local programme would be implemented as soon as practicable over as wide an area as possible and not be discouraged because a power station, steel works or chemical works nearby appeared to be making smoke or grit. He was sorry the public

meeting had not materialized but the House would appreciate that it was not appropriate to have civil servants speaking on what, in many quarters, would be construed as a political platform. If the smoke control advisory people or the Borough Council could convene a meeting there would be no objection at all to the local inspector being present.

After a further question from Mr. Rodgers regarding a solution to the specific engineering problem in the event of amine plant breakdown causing discharge, Mr. Corfield expressed confidence that the means would be found to overcome any defect that arose. He assured the Hon. Member that he would be the first to be informed if and when any breakthrough appeared.

The Crime of Burning Coal

A reader, Mr. C. D. Darley, Deputy C.P.H.I., Norwich, has sent us an interesting extract from a book entitled "The Rabbit Skin Cap", which is the tale of a Norfolk countryman's youth, written in his old age by George Baldry. (Edited by Lilius Rider Haggard and published in 1939 by Collins.) The author says:

"Without a doubt brick making and the brick industry would have been carried on centuries earlier if it had not been for the superstitious idea of burning coal which was considered a crime. Our Fathers looked on coal with awe, dreading the burning of it thinking they and the earth would be enveloped in the smoke, not so much as dreaming that it would become one of the natural resources of mankind, and one of the greatest."

West Bromwich Clean Air Council

At a meeting of the Council at the Tame Bridge foundry of W. T. Avery Ltd., Mr. A. H. Hunter, of J. Brockhouse & Co. Ltd. was elected Chairman and Mr. S. Cayton (West Bromwich C.P.H.I.) Hon. Secretary. After an address, a tour was made of the foundry, which was one of the first in the country to install a Whiting dust arrestor.

CARLESS ZONES

*The Editor,
Smokeless Air*

Sir:—In the Spring issue (No. 129) of SMOKELESS AIR, you invite readers' views in connection with the idea of carless zones—should the N.S.C.A. concern itself with such ideas, watch with passive approval, or ignore them? May I suggest that it should concern itself with such ideas, most actively, and furthermore go further in other ways.

Streets of large cities are now quite uncivilized due to the dirty and foul smelling air created by road vehicles using petrol and diesel engines. The dirt is not merely a matter of dirty deposits but of agents detrimental to health and well being also. The Health Committee of the L.C.C. drew attention to the health hazard, again, in February. A report in *Medical Tribune* (March 13), quoted by *New Scientist* earlier this year, points to an evil other than the physical effects of inhaling carbon monoxide, carbon dust, etc. Research in Germany suggests that carbon monoxide in exhaust fumes can impair mental reactions through affecting the central nervous system. If that is so, we are all being slowly but surely poisoned and destroyed.

Although I have not seen this discussed, there is the further question of pollution and poisoning as outcome of the use of additives in motor vehicle fuels.

The N.S.C.A. should certainly concern itself with carless zones, with car design, with engines and with fuels. It should not just report on developments but take an active part in educating the public on the dangers of, and damage already being done by, current developments when, against the best interests of comfort, health and civilized surroundings, more and more petrol and diesel vehicles are being put on to the roads. The "car lobby" wants to persuade the public that one car per family is not the ultimate aim, but two cars—is this not to be opposed? I think that to avoid a hell, it must be.

The N.S.C.A. already has working links with other bodies. Might not new links be established also. The Town and Country Planning Association interests itself in the problems of controlling environment and of traffic—hence of the air we breathe as well as of the nature of the places we live in—and its journal *Town and Country Planning* has published correspondence on these subjects (I had a letter in the July issue). A N.S.C.A.-

T.C.P.A. link would be most useful. The Electricity Council is backing research on the design of electric-powered road vehicles. With the setting up of a Ministry of Transport committee on cars, support for the Electricity Council is surely most necessary and could not the N.S.C.A. help? These are some ideas only.

And now look up at the sky and see the dirty exhaust trails of Boeing, Trident and other jets. What of them?

Yours, etc.,
Bernard Orna

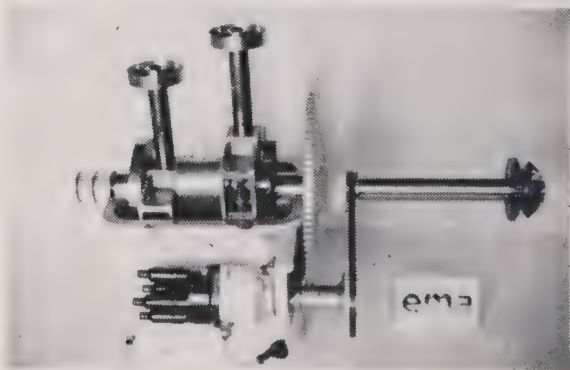
Twickenham

A CONTACTLESS PISTON SEAL

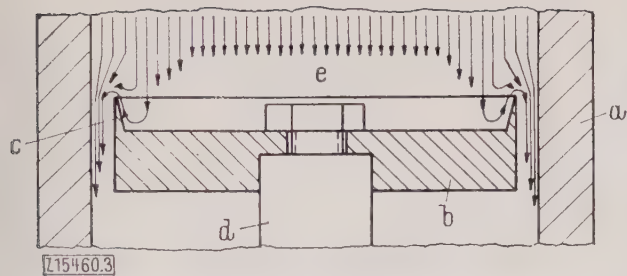
From Liechtenstein comes information of a new form of piston for internal combustion engines, which, it is said, will by improving combustion increase thermal and mechanical efficiency, and by its unique principle, will reduce the toxic or noxious gases in the exhaust.

In the ordinary cylinder of an internal combustion engine the piston fits closely to the cylinder wall, but is separated from it by a thin film of oil. The movement of the piston creates friction which causes a loss of power output and constant film wear. The breakdown of the oil leads to the emission in the exhaust gases of some of its more harmful constituents, including benzpyrene.

An engine which does not require lubricating oil in the cylinder, because the piston does not make contact with the cylinder wall, has been developed by the Entwurfs- und Maschienen-



The EMA contactless piston, showing design of the piston heads



Diagrammatic section of the EMA piston:
(a) cylinder, (b) piston, (c) knife edge,
(d) piston shaft, (e) compression space

bauanstalt of Vaduz, and appears to be potentially of considerable interest from the point of view of motor vehicle pollution control. Our illustrations show the principle and the special design of the piston head.

It will be seen that there is a gap between the piston and the cylinder, and that the seal is effected by contraction of the gases due to the pressure of a sharp edge on the circumference of the piston. Leakage is further reduced by eddy formation in the gap. The losses caused by the gap amount to less than 0.1 per cent of the net power.

A more detailed account, in English, of this development appears in an article by Dipl. Ing. L. Strach of EMA, in the May 29, 1964 issue of *The Engineer*.

Ironmongers to Aid Clean Air

The National Federation of Ironmongers has issued a leaflet describing a scheme to assist local authorities promoting smoke control areas. This is for assisting responsible retailers who are prepared to undertake the sale, installation and servicing of oil heaters on which a local authority has agreed to contribute a grant. Means are suggested by which the dealer might offer the householder facilities for paying off the proportion of the conversion cost not covered by the grant. More details can be obtained from the Federation at 20 Harborne Road, Edgbaston, Birmingham 20.

Electricity and Clean Air

The theme of this year's Electrical Power Convention held in Eastbourne from June 22 to 25, was "The Electrical Industry and Economic Growth". In his Presidential Address, Sir Harold Mullens, M.I.E.E., referring to the growth target of the industry said that while a conventional generating plant commissioned in 1950 had a thermal efficiency of 30.5 per cent, the average efficiency of the twenty best stations in 1962 was 32.6 per cent, and the 500 MW sets, some of which would be installed in 1965, had a design efficiency of 39 per cent.

Sir Harold Mullens stated that in recent years the non-industrial electrical load had exceeded the industrial one, but much remained yet to be done to make living better in our urban communities. He said: "The grime in which the majority of our cities and large towns are encased is something of which we should be ashamed. It is noticeably worse than in many similar cities and towns abroad and cannot be explained by climate alone. It is on record that a very long time ago a complaint was laid before Parliament that the new fuel (coal) was a public nuisance 'which was thought to corrupt the air with its stink and smoke' and its further use in London was prohibited by proclamation 'to avoid the sulphurous smoke and savour of firing'. That was in 1306 and obviously did not have much effect. In 1956 Parliament passed the Clean Air Act. This may be startling long-term consistency in political purpose but is this latest action of Parliament likely to be more effective than what happened 600 years ago? It should be because we now have the electric heater and earlier there was only the open hearth. Electric space heating and air conditioning have an important part to play in controlling and reducing the pollution of the atmosphere and at the same time increasing human comfort".



URGENT
NO SMOKE SIGNAL
FROM BIG CHIEF CLEAN AIR

Going
smokeless?

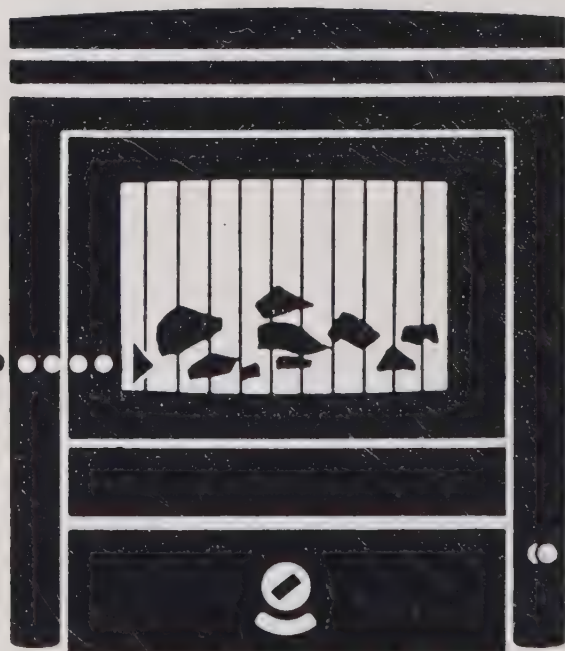
Fit Britain's top-selling room heater

Parkray

open fire
behind glass.....



A RADIATION PRODUCT



**The officially approved smokeless fire
that keeps the whole house warm**

CONTRIBUTIONS TO CLEANER AIR

Industrial and Domestic Heating News

CENTRAL HEATING IN COUNCIL HOUSES

This is the title of a handsome 48-page brochure published by Radiation Parkray Ltd., mainly for the interest and attention of local authorities. It is a survey, with many excellent illustrations, of the progress that has been made in the Tyneside area by the installation of either the Parkray 66 or 77 in local authority housing, giving partial or full central heating. The north-east, as the first area to meet with a shortage of open-fire coke, had to provide for the use of hard coke before other parts of the country, and this brochure demonstrates how well some of them have done it. Both the foresight and initiative of the authorities, and the enterprise and services of Radiation Parkray earn an honourable mention.

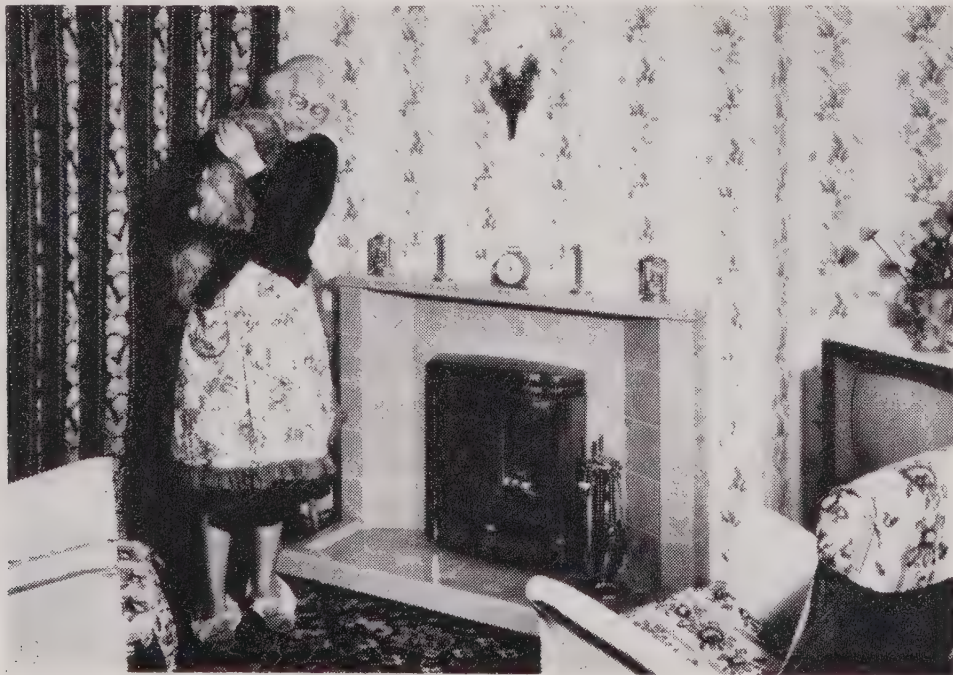
What will be useful to local authorities are the costing details that are

given for the installation of the Parkray system in different authority areas, and for differing needs. In Blaydon U.D.C., for example, the costings show that the ultimate cost of installing a long-lasting, highly efficient central heating system added £81 to the capital outlay of the house. This adds a little to the rent, about which it is said no one has protested, and which of course gives far better heating in the house, greater convenience, fuel economy—and clean air.

The brochure can be obtained from Radiation Parkray Ltd., Radiation House, North Circular Road, London, N.W.10.

Solid Smokeless Fuels Federation

The Federation has issued a new folder on "S.S.F.F. Service to Local Authorities Promoting Clean Air". This is a helpful publication that gives



A Parkray 66 in the sitting room of a ground floor maisonette occupied by an elderly widow at Wallsend. "This", says the Radiation Parkray brochure reviewed above, "reduces the amount of housework she must do to keep warm, consuming about 1½ cwt. of coke per fortnight"

the various services offered to local authorities, through exhibitions and displays, publications, information, and so on. The good work done by the Federation for clean air is well known to many local authorities, and this folder will be useful both to them and to others who may only just be getting down to the job.

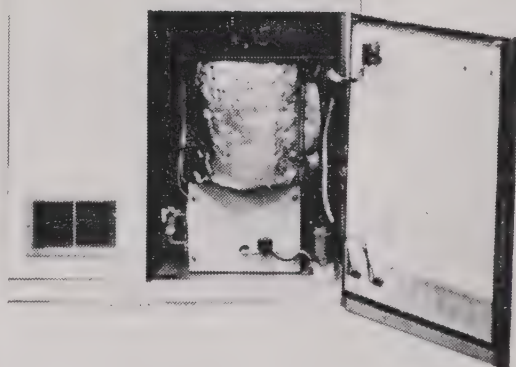
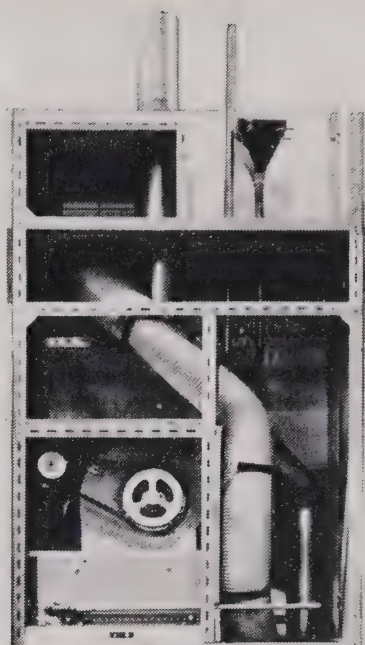
New Warm Air Unit

A new warm air unit designed specifically for industrialized housing has been introduced by Redfyre Ltd., Thorncliffe, Sheffield. Fired by oil or gas and able to supply domestic hot water as well as heating, this "Redfyre Warm Air Tower" is extremely flexible. It is designed for installation in the central section of the house and the unit consists of a boiler—the Redfyre "Centramatic 50, Series 2" (53,000 B.T.U's/hr.) or the Redfyre "Autogas 45 Standard" (45,000 B.T.U's/hr.)—a circulating pump, radiator type heat exchanger, fan, ducting and outlet grilles.

Water, heated in the boiler, is pumped through the radiator. At the same time, air is drawn in through the grille and filtered and forced through the radiator by the fan. The heated filtered air travels down through the duct to be discharged at low level through four grilles around the base of the unit. The inlet grille is hinged so that the replaceable filter can be easily slipped out for cleaning.

If required, a flexible duct can be incorporated to feed warm air to further grilles on first floor level to heat the upper rooms. A cylinder can also be connected to the boiler to supply domestic hot water. In warm weather, the pump can be switched off leaving the boiler to heat domestic water only, thus eliminating the need for any auxiliary water heater. The fan can be switched off or left running to circulate air through the rooms.

Both the boilers are thermostatically controlled. The Redfyre Centramatic 50 is fully automatic—the fan-assisted, vaporizing burner lighting by electric



The Redfyre Warm Air Tower, fitted here with a Centramatic 50 oil-fired boiler

ignition and extinguishing as required by the thermostat. The Autogas 45 also runs automatically once the pilot flame is lit. The unit can be assembled to fit in with any industrialized housing design. It can also be adapted for the conventionally-built home. It can be supplied as a fully assembled unit or in component form for assembly on site and with or without cladding. When supplied as an assembled unit, it is complete with plumbing and wiring so that it has only to be connected to the water, power and fuel supplies on site.

The units are 3 ft. 4 ins. wide, 2 ft. 4 ins. deep and the standard ceiling

height of 8 ft. but these dimensions can be varied according to the layout of the assembly to meet the builders' requirements.

Redfyre Gas Warm Air Tower Units are being installed in houses now being built for Skelmersdale U.D.C.

Automatic Chute Fed Incinerator

Dowson & Mason Ltd., Levenshulme, Manchester 19, have introduced an advanced form of incineration for all types of domestic refuse. Known as the "Refumatic", it is designed for installation in multi-storey blocks of flats, offices, hospitals and hotels.

The "Refumatic" is installed in a basement at the bottom of a charging chute running vertically upwards to the roof of the building. At each storey there is a hopper into which residents place their refuse which falls directly into the combustion chamber. There is a separate flue for the waste gases of combustion and an induced draught fan ensures the charging chute is under slight suction so that smoke and fumes cannot enter the building.

A water wash chamber receives the waste gases from the smoke burn off chamber. This is fitted with spray jets

to wash out all fly ash to ensure that only clean air is exhausted to atmosphere. This system is so efficient that tests show the amount of particulate matter discharged to atmosphere is approximately 0.22 lb. per 100 lb. of refuse.

The burners use town gas at ordinary mains pressure and incorporate a fan for the combustion air. They are fully automatic, being controlled electrically with spark ignition and safety lock out in the event of flame failure, interruption of electric or gas supply etc. Burning periods are thermostatically adjusted to the flow of refuse, eliminating waste of fuel gas and avoiding the unhygienic practice of storing refuse inside apartments.

The "Refumatic" is available for 100 to 1200 room capacities.

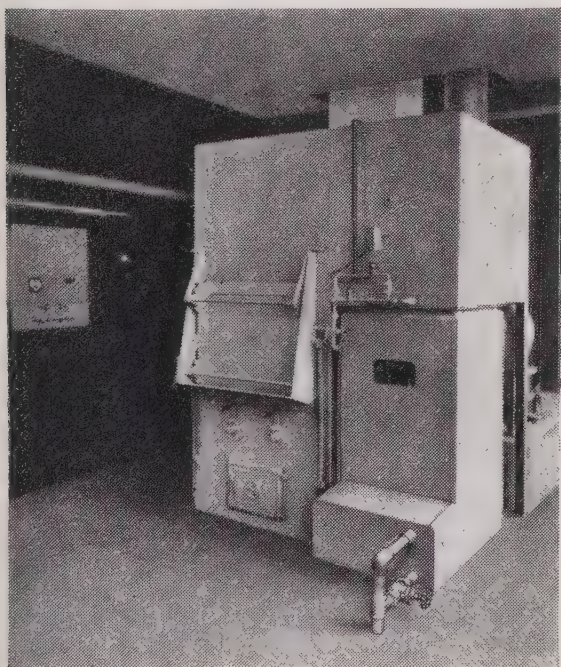
Potterton Expands its European Markets

Thomas Potterton Limited, one of the country's leading manufacturers of central heating boilers, and a member of the De La Rue Group, is expanding its European markets. They have taken over their Belgian distributor, Abair S.A. and negotiations are in progress with other countries of the Common Market for the establishment of similar marketing and distribution arrangements for the company's gas and oil-fired boilers.

Potterton is one of the three principal subsidiaries of De La Rue—the others are Formica International Limited and Thomas De La Rue International (banknote and security printing)—a group which already has 44 companies in 19 different countries.

The Belgian company, to be known as Abair-Potterton S.A., has, since 1959, distributed gas boilers from the well-known DIPLOMAT range. More Potterton products, including its larger gas-fired boilers and BOA and DOA series of oil-fired boiler/burner units, are now to be marketed through the new company as part of the planned expansion.

The discovery of vast reserves of



The Refumatic incinerator

natural gas in Holland will mean a rapid expansion of gas heating throughout Western Europe and Potterton's intend to share in this business.

The Board of the new company will be the Chairman of Potterton, Mr. E. G. Brooks; Mr. J. G. Barnes, the Managing Director; Mr. George and Monsieur Rene Geisseler, Abair's General Manager. Mr. J. D. Rice of Potterton is appointed General Manager designate.

Electric Thermal Storage Heating by Hot Water

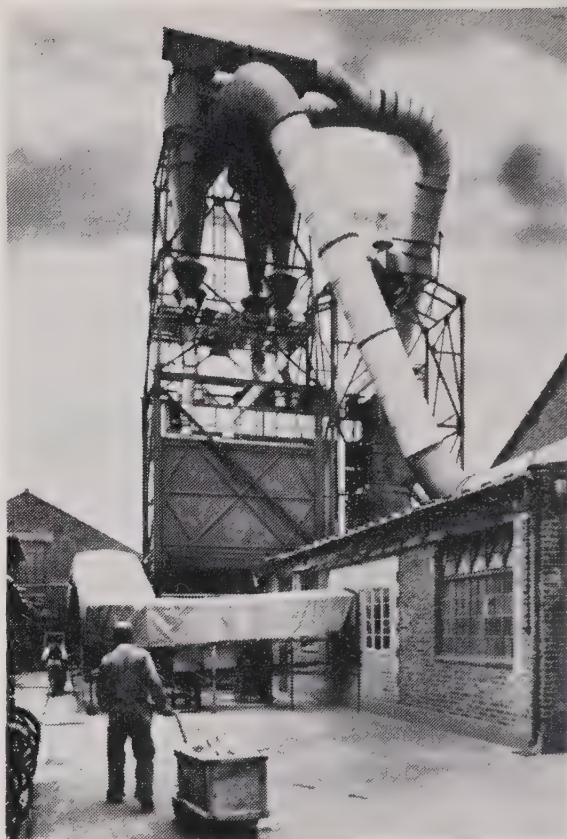
Though much attention is being given to the use of off-peak electricity for heating by storage heaters, or by underfloor cable systems, the older method of using the electricity to heat water, and then circulating the water to radiators or in other ways, should not be overlooked. It is particularly useful and very efficient for large premises, and the water may be heated whether by immersion heaters or by electrode boilers. In the latter the current passes through the water between special electrodes, using the resistance of the water itself to generate heat.

One of the specialist firms in this field is Bastian and Allen Ltd., who have just issued a descriptive illustrated brochure on the subject. Copies may be obtained from the Group Publicity Department, Parkinson and Cowan Ltd., Terminal House, Grosvenor Gardens, London, S.W.1.

New Catalytic Combustion Process The "Decatox"

A new process has been reported for the elimination of the obnoxious and toxic fumes in the gases from organic chemical processes. This is a catalytic after-burning process known as "decatox", which is said to be much more economical than any previous process, yet wholly effective.

Previously, effluent gases of this nature had to be burned at a high



A dust removal plant for wood waste and sanding dust, at Liden Products Ltd., installed by Dust Control Equipment Ltd., of Thurmaston, Leicester

temperature (about 800°C) and a complicated chemical analysis had to be made beforehand. The Decatox process does not require such analysis and burns the gases down to water and carbon dioxide at a temperature of only 200-300°C.

Catalytic processes have usually required the use of high cost platinum and palladium, making the method expensive. The new process, however, uses only base metal oxide catalysts which are inexpensive and readily available. Each case to which the process might be applied is examined individually and information obtained by questionnaire. If necessary, a mobile Decatox apparatus can be used on site to determine through practical experiment such factors as the costs of installing and running the necessary plant, the lifetime of the catalysts and the best methods of utilizing the heat produced.

The process comes from Benno

Schilde Maschinenbau-AG, of Bad Herfeld, Germany, and their sole agents in the U.K. (to whom inquiries should be made) are Arpal (Engineers) Ltd., of Abford House, 15 Wilton Road, London, S.W.1.

More Power for Central Southern England

The Central Electricity Generating Board have received the consent of the Minister of Power to construct a coal-fired power station on the redundant Central Ordnance Depot at Didcot about nine miles south of Oxford.

The new station will have an installed capacity of 2,000,000 kW. comprising four 500,000 kW. turbo-generator and boiler units. It will be the first new inland power station to be built in Central Southern England since the war.

The siting of such a large station remote from supplying coal-fields in Central England has become an attractive proposition due to the reduction of coal transport costs resulting from the introduction of the permanently coupled system of train working.

The first 500,000 kW. unit at Didcot is expected to begin operating in 1969 and the station to be in full operation in 1971.

Barnsley BurnBrite

The Barnsley District Coking Company, Ltd., of Worsbrough, near Barnsley, have produced "Barnsley BurnBrite"—a new smokeless fuel

that is manufactured from high-grade coal with a low ash-content, supplied by the National Coal Board. It is claimed that the fuel is not only cleaner (because of the low ash-content), but hotter and longer-burning than any similar fuel. While the makers do not say it is easier to light than similar fuels, they have not yet encountered a consumer who has had difficulty in using the sticks-and-paper method of ignition. A test made by a member of the local Consumers' Association (who is also a local Councillor) has resulted in the verdict "very good". The Coking Company have promised the Councils in the Barnsley area that when a Clean Air Zone is designated, enough of the fuel will be reserved to meet any failure of the supply of other premium smokeless fuels. Experimental work continues further to improve the fuel.—*Report from "Quality of Sheffield", July, 1964.*

Coalite Progress

The reports and accounts of Coalite and Chemical Products Ltd. for the year ended 31st March, 1964, show further progress by the company. Profits, after depreciation and before taxation, were £1,375,897 compared with £1,168,210 the previous year.

The report states that further progress has been made to the automation and smoke abatement of battery operations. All batteries of retorts at both Askern and Bolsover are now being charged and discharged by automated machines. The production of Coalite is being increased and it is said that "it is not expected there will be any difficulty in disposing of the increase in output as it becomes available".

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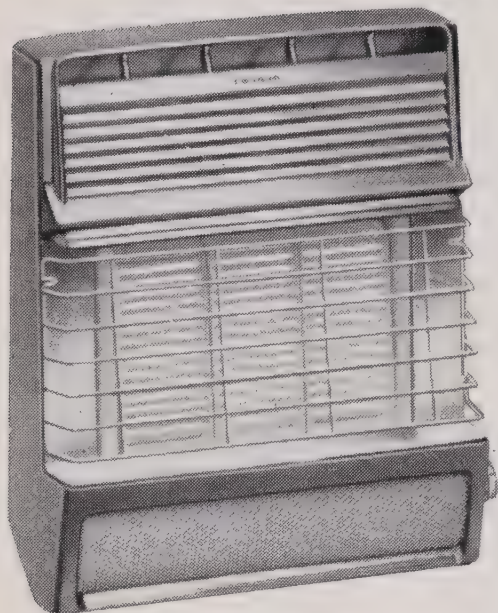
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AIR POLLUTION ABSTRACTS

749. The Measurement of Atmospheric Sulphur Compounds using Lead Dioxide. Lawrence, E. N. (*Int. J. Air Wat. Poll.* July 1964, **8**, 381-388). The effect of wind speed on the reaction of lead dioxide with atmospheric compounds of sulphur is examined. The results from experiments (Lawrence, 1962 a and b) with the standard (cubical) lead dioxide atmospheric pollution measuring instrument described in a publication of the Department of Scientific and Industrial Research (1957) are compared with those obtained from the exposure of unprotected lead dioxide in a wind tunnel (Wilsdon and McConnell, 1934). Allowing for differences between the two environments (atmosphere and wind tunnel), the results are found to be generally consistent.

A formula is developed relating concentration of atmospheric sulphur compounds to the mean external wind speed and the sulphation of lead dioxide within the cylindrical louvred screen of a modified atmospheric pollution measuring instrument (described by Bowden, 1964). This formula and the corresponding formula (Lawrence, 1962a) for the standard (cubical) instrument are found to be consistent with results obtained by Bowden (1964) from a comparison of the sulphation of lead dioxide within cubical and cylindrical screens.

Orientation and exposure to wind of cubical and cylindrical instruments are discussed with reference to their effects on the pollution measurements from these instruments. A further improvement of design for a lead dioxide air pollution measuring instrument is suggested. Lastly, the siting of lead dioxide instruments is discussed.

750. Modern Methods of Gas Manufacture Including the Lurgi Process. Ricketts, T. S. (*J. Inst. Fuel*, Aug. 1964, **37**, No. 283, 328-341). The paper sets out the basic reasons underlying the decline of the carbonization process as a source of manufacture of modern town gas, and describes how the gas industry has been forced to consider alternative methods of gas manufacture based broadly upon two main avenues of investigation. The first of these is concerned with processes utilizing cheap low-grade coal such as the Lurgi high-pressure coal gasification process; the technical and economic aspects of the various Lurgi plants in operation

throughout the world are described and reference is made to the joint study which has been undertaken by the National Coal Board and The Gas Council and to the research work being carried out by The Gas Council on the slagging gasifier, the hydro-gasification of coal, and the Otto Rummel gasifier. The second line of investigation has been based upon the use of petroleum products and reference is made to the work carried out in Britain during the past ten years on oil gasification with particular reference to the Onia Gegi and Segas processes. The important development work carried out by Dr. Dent and his staff at The Gas Council's Midlands Research Station at Solihull is referred to and the paper concludes with a description of the I.C.I. light distillate continuous reforming process which is being widely adopted by the gas industry in Britain.

751. Modelling of Stack Gas Dispersal. Vaclavik, M. and Svoboda, O. (*Czech. Tech. Digest (S.N.T.L.)*, June 1964, **6**, 3-8) (C.E.G.B.). Experiments carried out on power-station models in a wind tunnel to study the relationship between wind speed and gas exit velocity are described and illustrated. The height of the stacks was also varied. The effect of aerodynamic conditions around the top of the chimney on dispersal of the plume is briefly considered.

752. The Disposition of Atmospheric Fluorides by Vegetation. Benedict, Harris M., Ross, James M. and Wade, Robert W. (*Int. J. Air Wat. Poll.* May 1964, **8**, 279-289). Alfalfa, orchard grass, chard, endive, spinach and romaine lettuce were grown in sand culture and fumigated with hydrogen fluoride in the atmosphere at concentrations primarily under $1.0 \mu\text{g}/\text{m}^3$. The fumigations were continuous for periods as long as four months. Under the conditions of the experiments, no significant effects of the fluorides were found on the growth of above ground portions of the plants as long as the leaves did not develop any markings ascribable to the fluorides. The results indicated that the growth of the roots may have been suppressed slightly by the fumigations. Additional studies are needed to verify this result. Analysis of plant organs and tissues indicated that the fluorides were taken in by the leaves or chlorophyll-bearing tissue (stems of alfalfa) and

translocated to the leaf extremities. No evidence of downward translocation was found.

753. Fuel and Productivity in the Chemical Industry. Nonhebel, G. (J. Inst. Fuel, May 1964, **37**, No. 280, 208-218). Because the heavy chemical industry is so large a consumer of primary and secondary fuels, engineers have used the opportunity to install much equipment of advanced design. By-product heat is recovered, wherever economically justified, from gases, liquids and solids. Seventy per cent of the electricity of the largest fuel user is made by back-pressure generation. Methods are described of comparing costs and thermal performance of boilers operating at different pressures, of evaluating purchases of coal, and of allocating charges for L.P. steam and back-pressure generated electricity in order to avoid wrong decisions. Spectacular reductions in fuel usage have been obtained by changes in process, by using different raw materials or by changing from batch to continuous operation.

754. Improved Lead Dioxide Method of Assessing Sulphurous Pollution of the Atmosphere. Bowden, S. R. (J. Air Wat. Poll. Feb. 1964, **8**, (2), 101-106) (W.S.). A simplified lead dioxide method is proposed, which occupies less working time than that in general and also dispenses with a standard tapestry-cloth. The modifications of cylinder and processing have no significant influence upon the results obtained.

A cylindrical louvered box could advantageously replace the present cubical box, but results would be raised by about 20 per cent to a level close to that given by the cowl used before 1945; it would, therefore, be necessary to apply a correction.

755. Fly Ash and SO₂ Emission and Combustion Residues of West German Power Stations. Results of a Questionnaire of the V.G.B. of 1962. Heimendahl, P.v. (Mitt. V.G.B. No. 87, 1963 (Dec.), 409-15) (In German). (Monthly Tech. Bull. March 1964, **18**, 6 pp., 98-99). The results of an evaluation of the questionnaire show that between 1952 and 1962 the emission of fly ash from power stations has been reduced to 27 per cent despite an increase of power generation of 130 per cent, owing partly to the decrease in coal consumption per kWh generated and partly to the installation of improved dust separators. The emission of SO₂ has doubled. The members' works were asked to indicate if they were able and willing

to use fuels of low S content in weather conditions leading to smog formation; the replies show that in the Ruhr region, the most endangered part of Germany this would lead to a reduction of only 5 per cent of the total SO₂ emission in this region. A table summarizes the dumped and utilized amounts of cinders, slag and ash produced in power stations.

756. Distribution of Sulphur and Chlorine over Europe. Bary, E. de and Junge, C. (Tellus, Nov. 1963, **15**, (4), 370-381) (W.S.). Maps showing the mean concentration of sulphur and chlorine in air and precipitation over north western Europe in summer and winter have been constructed. Excess SO₄-S has been computed on the basis of the assumption that chloride is a conservative property of sea spray particles and that there are no other sources for chloride than sea spray. Finally, maps showing the ratio of concentration air/precipitation for sulphur and chlorine are presented.

757. Atmospheric Pollution by SO₂ from an Isolated Chimney. Zielinski, E. (Combustion, Feb. 1964, **35**, No. 8, 16-25) (W.S.). The author described experiments in which the SO₂ concentration at various distances from a single stack were measured and the results examined statistically in order to obtain probability parameters for pollution.

758. Atmospheric Aldehydes Related to Petunia Leaf Damage. Brennan, E. G. and Leone, I. A. et al. (Science, 21 Feb. 1964, **143** (3608), 818-820) (W.S.). Snow-storm petunias grown in the greenhouse developed a necrotic banding of the actively expanding foliage characteristic of injury ascribed to various photochemically produced pollutants in the atmosphere. In this case the damage appeared to be related to the high aldehyde content of the ambient air. Each time the aldehyde concentration exceeded 0.20 parts per million for two hours, injury appeared within a day or two. From July to September 1963 such plant injury was observed on several occasions.

759. Fume Cleaning at Ebbw Vale and Spencer Steelmaking Plants. Mitchell, R. T. (Steel Times, 14 Feb. 1964, **188**, No. 4987, 212-5). (Als. from Current Lit., Feb. 1964, **24**, pt. 4, 213) (W.S.). Describes and compares the two systems of fume cleaning as installed by RTB Ltd. on a 30-ton LD-AC converter at Ebbw Vale (electrostatic precipitator) and on the three 100-ton LD vessels at Llanwern (venturi wet scrubber).

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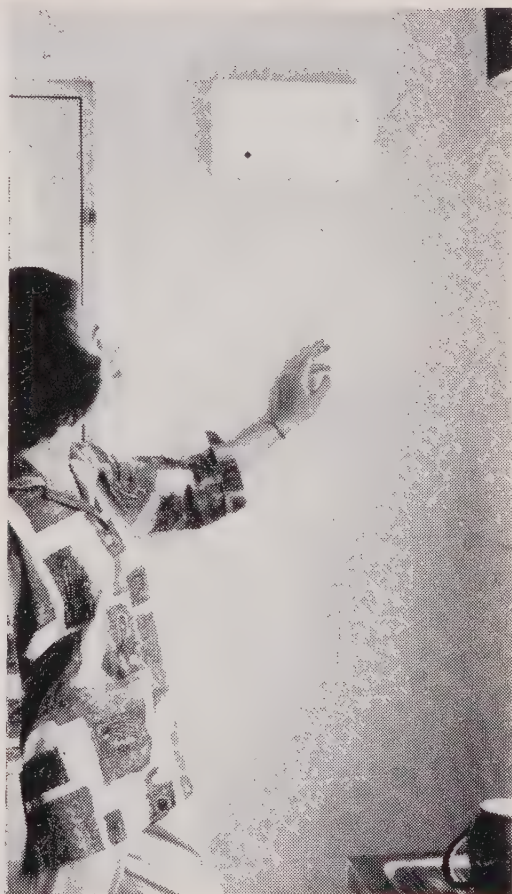
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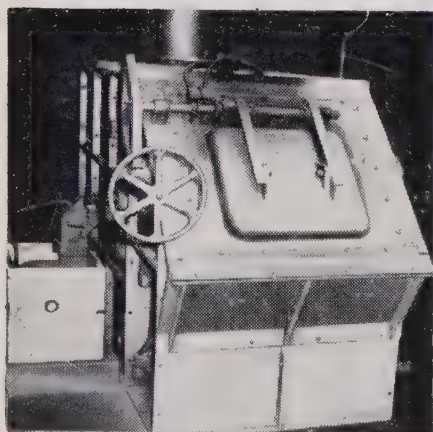
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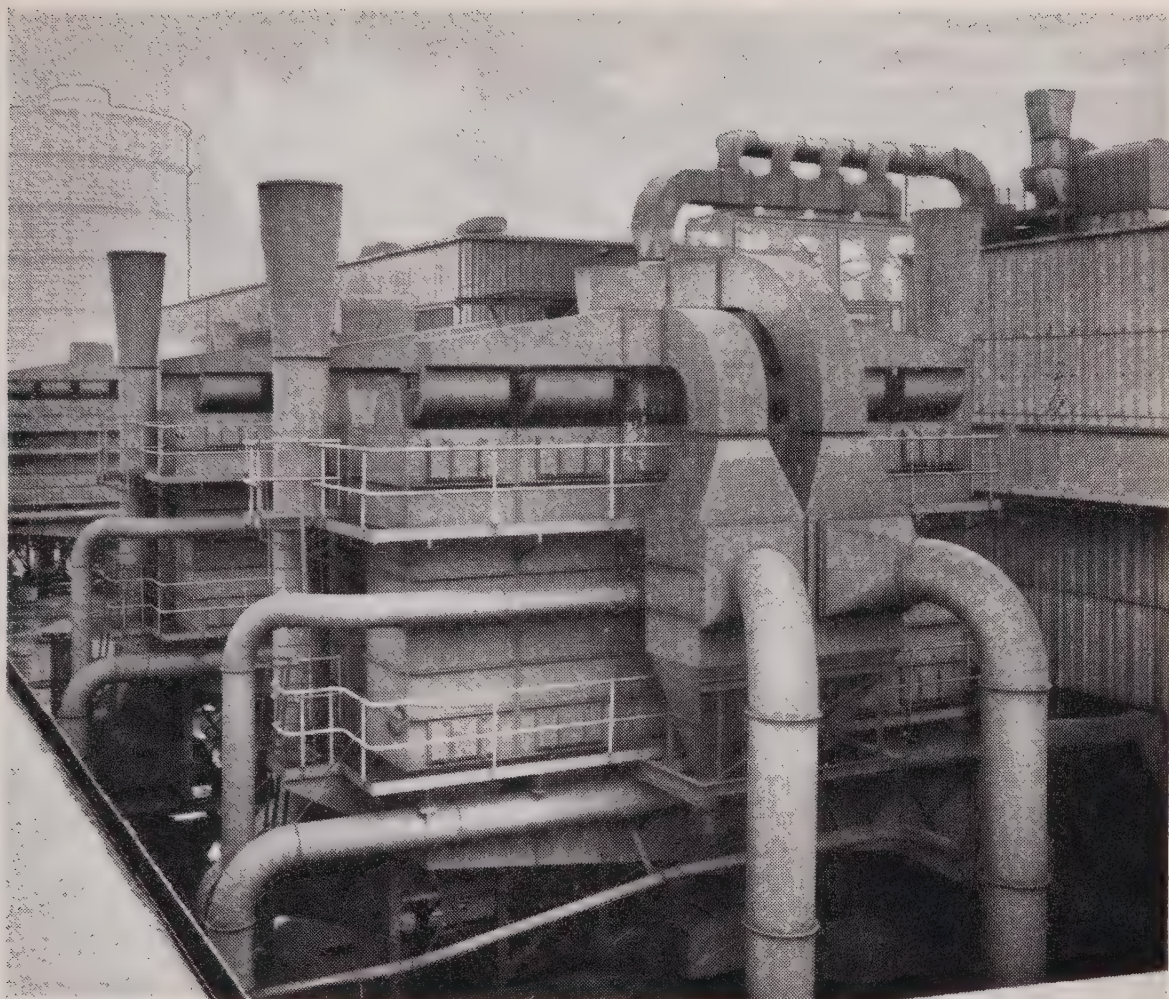
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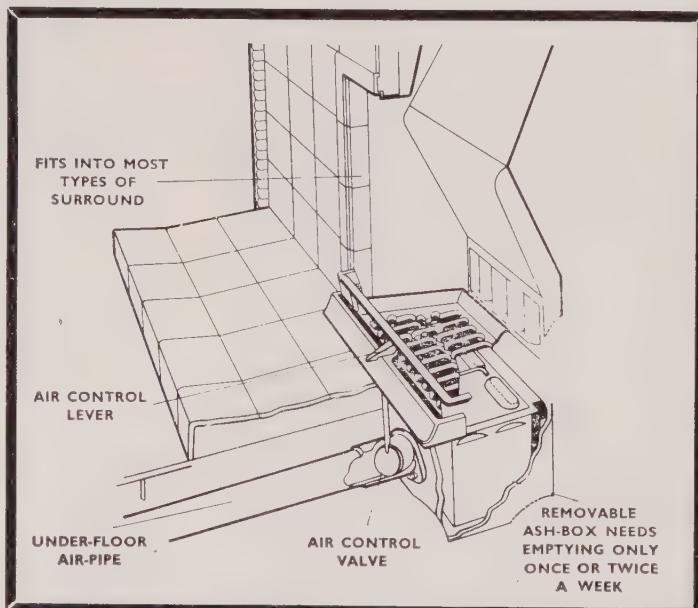
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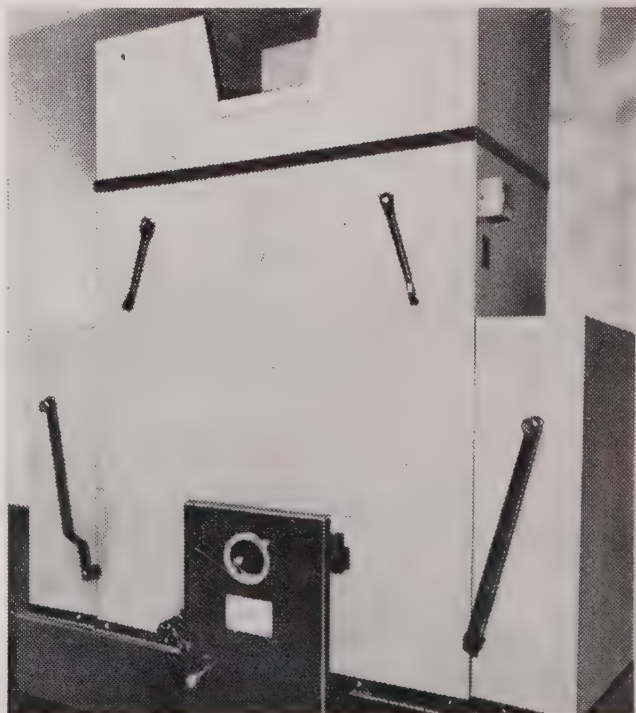
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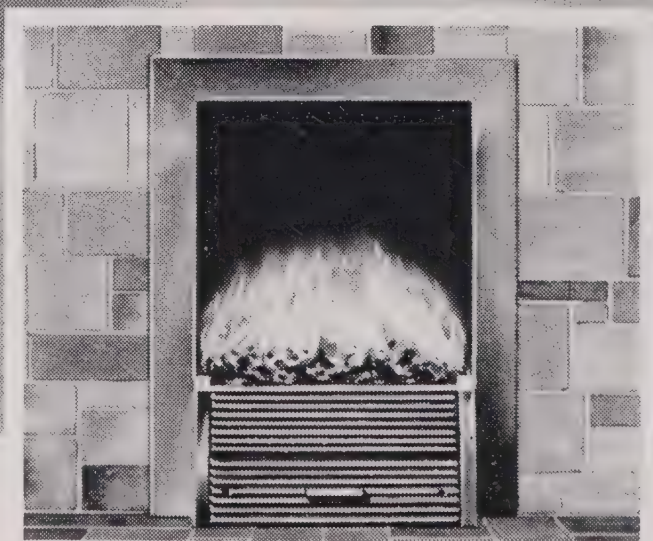
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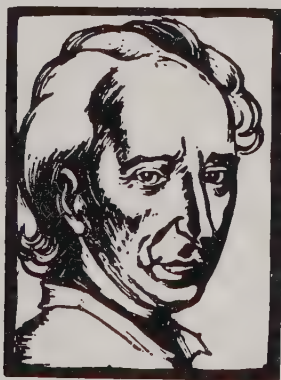
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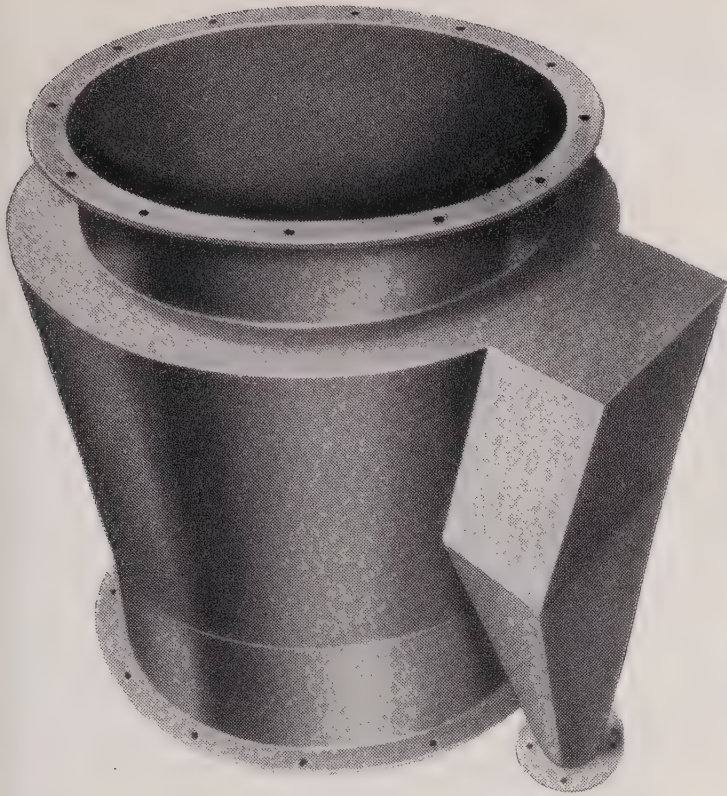
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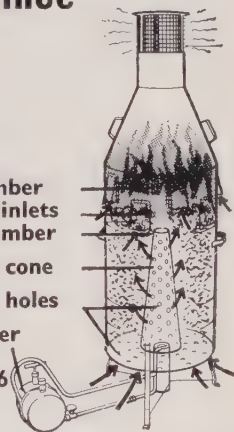
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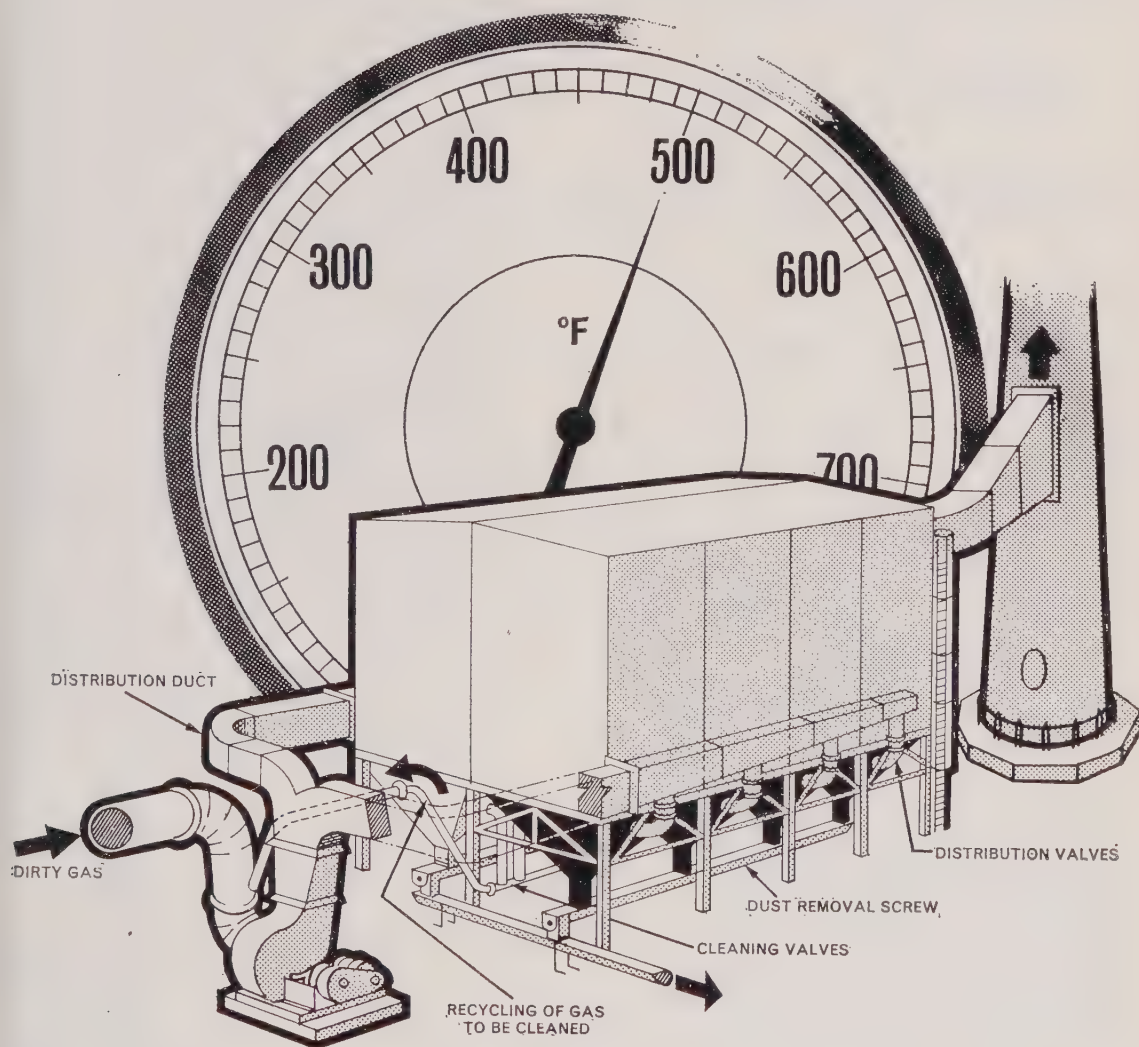
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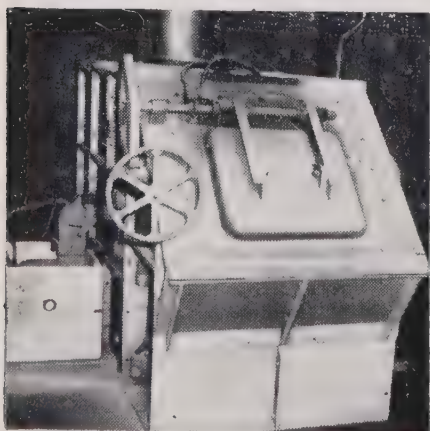
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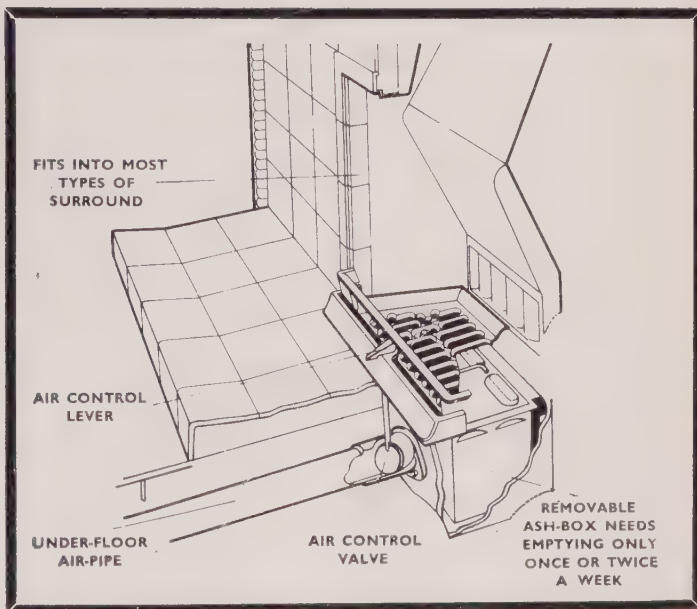
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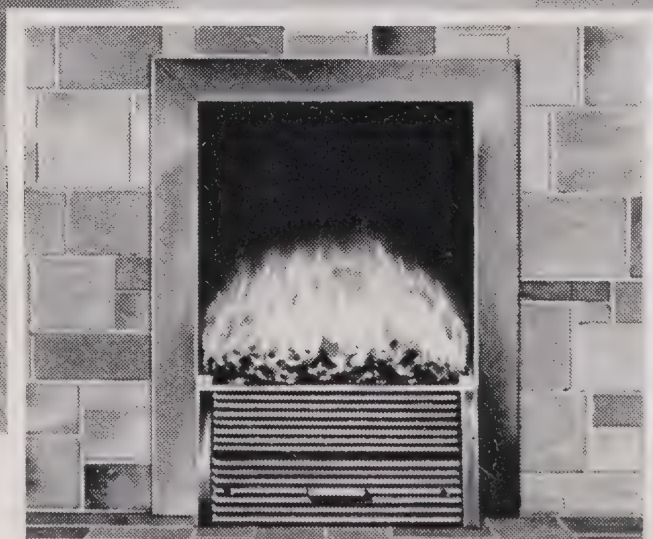
THE SULPHUR DIOXIDE REPORT

A second printing of the report has been called for, and copies are available in quantity for local authorities and other bodies at 16s. per 12 copies, or £6 per 100, post-free.
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The Annual General Meeting and Luncheon at the Connaught Rooms, London, on
Tuesday, May 4.—Annual Conference, Eastbourne, October 26-29

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SMOKELESS AIR

Vol. XXXV No. 132

Winter 1964

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

SULPHUR DIOXIDE

THE report of the Society's Technical Committee on "Sulphur Dioxide as an Atmospheric Pollutant" was presented and discussed at the Harrogate Conference in October, but was published and issued to the Press shortly before then. Despite preoccupation with the general election campaign the report received wide and favourable publicity. The only criticisms we have heard were during the discussion at Harrogate, when an understandable desire for something much more radical was apparent. That desire the Technical Committee would be ready to endorse if it were not for the plain facts that we are bound to face—that as indicated in the report no feasible programme can be at present envisaged to rid our atmosphere completely of this noxious gas, though something can be done to reduce emissions and more to mitigate their effects.

For large scale industrial emissions high chimneys may not be the best or final answer, but it is the best available; while for the domestic emissions at low level the changes needed for smoke prevention are precisely those that must be advocated for reducing sulphur dioxide—by higher efficiency usage for solid fuel, and the greater use of gas, electricity and light oil. Thus if we assume that in a smoke control area 40 per cent of conversions are to solid fuel in room-

heaters, etc., and the rest are to gas, electricity and light oil, then on the basis of the figures given in the report, *no less than 80 per cent of the low-level sulphur dioxide emission will be eliminated.*

The report should convince local authorities who are hesitating about smoke control area measures that by getting rid of smoke they are also reducing the quantity of sulphur dioxide at breathing level. This is one of the reasons why we are anxious that the report should be widely distributed among local authorities. (It can be supplied at reduced prices for quantities).

Among the many reviews of the report was one, a leader in the *Yorkshire Post*, that was particularly understanding. (It is reprinted in full on another page). It said that the report was the answer to what it called the Sulphur Dioxide Sect—those who criticize action to prevent smoke because sulphur dioxide cannot also be prevented. Surprisingly, this cock-eyed argument is still apt to crop up—a recent example, from Darwen in Lancashire, is reported on another page.

J. S. Carter

By the time this is published Dr. J. S. Carter will have retired from his post as Chief Alkali Inspector, and the opportunity must be taken of

Facing is a recent photograph of St. George's Hall, Liverpool, showing the cleaning of its long-blackened surfaces nearly completed. Cost: about £21,000

both wishing him well in his retirement and of placing on record what we are sure will be the gratitude and thanks of the entire clean air movement in this country for all he has accomplished. Despite the unfortunate physical difficulties with which he has had to contend in recent years he has achieved much, both in what he did and the inimitable way in which he did it. The added duties of the Inspectorate imposed by the Clean Air Act, and the many recent developments in industry, giving new pollution hazards, have extended and made more complex the responsibilities of the staff and must have been a heavy burden on the Chief Inspector and his deputies. Yet not only has all this been successfully achieved, but it has been accompanied by an added respect and appreciation of the Inspectorate by industry and by the local authorities alike, thanks very largely to the personality of Carter himself. Elsewhere in this issue, for the benefit of the many readers who were not at Harrogate, we reprint in full the Des Voeux Memorial Lecture he read at the conference—his last paper in an official capacity. The Ministry's own press statement about his retirement says "He is well known for the fund of stories of the early days of the Inspectorate and his own experiences." So what we would like, sometime when the dust of office has safely settled, would be an entirely *unofficial* paper.

Bronchitis and Lung Cancer

On another page we give a summary report of the latest research report on the relationship between air pollution and bronchitis and lung cancer. Based on a survey in polluted and rural areas in north-east England, the report makes two important conclusions for the area surveyed: (1) bronchitis mortality is more strongly associated with air pollution than any other factor studied, including smoking habits, and (2) for

lung cancer the strongest of the associations studied is with smoking habits and the next strongest with air pollution.

Like all the other statistical surveys that have been made, this does not "prove" a case, but it does provide fresh evidence and reinforces the thesis that air pollution is a significant factor in the incidence of both these diseases. Indeed, for bronchitis it reinforces it considerably. It is commendable that such work should be carried out on behalf of, and be published by, the Tobacco Research Council, even though, as in this case, the findings should in fact also strengthen the evidence on the association between smoking habits and lung cancer.

Section Sixteen

The Society's Parliamentary and Local Government Committee has been discussing difficulties in operating Section 16 of the Clean Air Act. This is the section that covers smoke emissions that do not come from chimneys or are other than dark smoke. The curious thing about this section is that it contains the vestigial remains of a principle used in the older legislation and now otherwise discarded—namely, that smoke emission was an offence only when it caused a demonstrable offence to someone. Now, for dark smoke, or any smoke from new installations or in smoke control areas, the mere emission beyond stated limits, or any at all, is an offence. There is no question of having to prove a specific nuisance. However, under s.16, it is still necessary to prove that there is a nuisance to "the inhabitants of the neighbourhood".

There are at least two major weaknesses in this. First, the inhabitants may by other standards be suffering from the pollution but are inured to it, or may be unwilling to come forward and give evidence. (They may work for the firm concerned.) Or, secondly, there may be no inhabitants in the neighbourhood. It may be argued

that if there are no inhabitants the emission does not matter. It might not, but it might. It could be affecting those working in, but not inhabiting, the neighbourhood, it might be injuring crops or livestock, or it might be drifting and adding to the general pollution of the area.

Unsatisfactory though S.16 is, to amend it would call for a definition of what constitutes an offence or how an offence is to be determined. It could perhaps be based on the submission of technical evidence showing how the emission could be abated; in effect using the "best practicable means" formula. The Committee had before it an actual example which illustrated the difficulties referred to, and would be grateful to hear for further cases where the use of s.16 would be appropriate but cannot readily be used.

This matter is one example of the examination of the working of the Act that is being made by the Committee, which hopes to build up a sort of dossier that can be used, when the time is ripe, for seeking revisions of the Clean Air Act.

Group Heating

Before the war, and during the early post-war years, the Society and this journal did much to promote discussion on district heating. It was regarded as a promising method for abolishing domestic smoke, and some advocates regarded it as the one real hope for achieving this. For a time it seemed that district heating would make great progress. Such progress, we were told, was already being made in other countries, and we could do the same. There were a few successful installations, when favourable conditions were present, among them the Pimlico scheme. Then district heating faded from the scene. The reason for this loss of interest was economic rather than technical, and much seemed to hinge on how to charge for the hot water supply—a fixed charge led to costly waste, and there

were apparently difficulties in the way of metering the supply and charging accordingly.

Now, it is encouraging to note, there are signs of a real revival of district heating development under the new and perhaps more appropriate name of "Group Heating". This suggests more compact and manageable schemes and is more accurate. The idea is being actively pursued by the National Coal Board, and one such scheme at Billingham was visited by a party of the delegates attending the Society's recent conference. Such schemes, especially for new local authority and other compact housing, provide a means of using coal efficiently and smokelessly, and can make possible new smoke control areas without adding to the demand for solid smokeless fuel. Moreover, with reasonably high chimneys at the boiler house they will give less sulphur dioxide emission than with individual solid fuel installations, and would discharge it at a much higher level. There may be a case for group heating with oil, although from the clean air point of view the lighter grades can be used just as readily for individual central heating boilers. It is, however, as a new market for coal that the prospects seem to be most promising.

As a footnote to this, a Danish technical journalist with whom we were recently talking was intrigued to learn that in Britain we were pressing hard for the installation of closed roomheaters. In his country, he said, these have been in use for many years and were now being discarded—for group heating! His own home was so served, and he was enthusiastic about the greater warmth and convenience his family was enjoying, and about how much less it was costing him.

Northern Ireland—A successful one-day conference (with an exhibition), to publicize the new N.I. Clean Air Act, was held in Belfast by the Society's Division on November 26, and will be reported in our next issue.

CLEAN AIR MEASURES EASE FOG DANGERS IN NORTH SMOKE CONTENT WORST IN SUBURBS

The above were the double column headlines given to a dispatch in "The Times" from its Northern Correspondent on November 10. By kind permission of the newspaper we reprint this greatly appreciated report in full.

South Lancashire and North Cheshire were today in the grip of some of the worst fog experienced for two years. There were, however, signs that smoke abatement measures in the major towns were preventing a dangerous smoke-laden fog from developing.

Dense natural fog blanketed the whole area from before dawn and Manchester airport had one of its few days of complete close down in recent years. On many occasions last winter the airport was open while London was closed and landing fees from diverted traffic created substantial additional revenue.

The fog in the Manchester area followed a pattern that has become increasingly marked since smoke control areas have been extended across a wide area of the city centre and throughout the whole of the vast Wythenshawe housing estate.

Benefits of Heat

Motorists who set off in dense white natural fog in the country and outer suburbs encountered stretches of soot-laden fog in the inner suburbs, which are not yet subject to smoke control, and then ran into comparatively clear air in the city centre, where control is absolute and where the smokeless heat from buildings tends to clear the natural fog. The sun broke through in Manchester city centre early today while visibility was down to 50 yards in the surrounding country.

Officials of the city's public health department said that a few years ago weather similar to today's would probably have produced a dense yellow fog of a type dangerous to sufferers from bronchitis.

A quarter of Manchester and two-fifths of neighbouring Salford are

under smoke control. Some of the worst smoke-making areas have disappeared in the past two years under slum clearance schemes.

Public health officials in both cities have noticed increased public co-operation recently as the benefits of smoke control measures have become apparent. Manchester, which pioneered smoke abatement with its own parliamentary Act in 1946, has 64,000 premises under control orders but has not yet had to bring a formal prosecution against a householder.

Although detailed and fully valid comparable statistics are unlikely to be available until 1970, when most of the smoke control schemes under the Clean Air Act should have been completed, readings being taken for a Department of Scientific and Industrial Research survey show that steady progress is being made.

Dangerous Road

At Manchester airport today the fog was comparatively smoke-free although visibility was well below landing limits. "These are the sort of conditions that no amount of smoke control can alter", an official said. A marked improvement has however, been noted in recent years in the amount of smoke haze which is brought to the airport from the city when there are light northerly winds. At one time smoke haze on its own could bring visibility below landing limits.

The worst, and most dangerous, conditions today were on the East Lancashire Road linking Manchester and Liverpool. This road is flanked by industrial and housing areas which are not subject to smoke control, and visibility at times was down to a few feet. A number of vehicles were involved in "concertina" accidents.

Address by Lord Sherfield

I AM honoured by your invitation to open the 31st Conference of your Society. You are, I think, usually addressed by a Minister on these occasions, but clearly the moment was not going to be propitious for a ministerial appearance, and so it is an occasion for what in American baseball is called "a pinch hitter".

I have no kind of expertise in your special field, but I am, like every other thoughtful member of the public, a warm supporter of the objectives of your Society, though I was not aware, as I should have been, of the scope and breadth of your activities, and of the weight of opinion that you are able to bring to bear.

As the owner-driver of a rather low sports car, I am very much aware of the hazards of being caught in a traffic jam within a few feet of a diesel engine pouring out black fumes. One can almost feel one's expectation of life slowly being curtailed. I was, therefore, glad to see that the resolution proposed by your Technical Committee, and carried at the last session of the Conference, about the pollution from road vehicles, was followed by the official action taken in the last year for the spot-check of diesel engined vehicles. I do not know whether this was cause and effect. Maybe the Ministry were already moving in this matter, but the time sequence is in the Society's favour; they can fairly take some credit for the outcome, and we can today only applaud the action taken by the Ministry, and urge them not to weary in well-doing.

When your President and Council invited me to come here today, they pointed out that you would have addresses by senior members of the principal fuel industries on the contributions to clean air which their



Lord Sherfield at the Conference

products could make, but that there was no representative of atomic energy, and I was accordingly invited to "pinch-hit" here as well.

Although I handed over the reins of the Atomic Energy Authority to the experienced hands of Sir William Penney a few months ago, my interest in the subject is undiminished, and I should be glad to say a few words about it.

As the latest arrival on the fuel scene, atomic energy should normally be advocated with due discretion and modesty. But since it is so often thought to be an ugly duckling, the child must occasionally stand up for itself.

Atomic power was introduced into the world under military auspices, and in circumstances involving a new form of pollution of the atmosphere which had particularly dangerous and terrifying possibilities.

Some of the fears rubbed off, as it were, on the peaceful applications of

atomic energy, which have suffered from a kind of guilt by association. Another handicap, at least as far as public opinion on atomic energy is concerned, has been the effect of the period in which premature (I will not say exaggerated) claims were made for atomic energy at a time which a French writer has named "the years of euphoria". It is, therefore, just worth reminding ourselves of a few facts.

Three and a half per cent of the installed capacity of electric power capacity in the United Kingdom is now nuclear, and by 1969 this will have risen to eight per cent. Since this capacity is almost entirely base load, the actual proportion of electricity consumed which is produced by nuclear stations is, and will be, a much higher percentage.

Impeccable Performance

The first graphite gas-cooled reactor producing electric power, started up eight years ago at Calder Hall and the eight reactors of this type which came into production between 1956 and 1960 have performed impeccably at a power rating of 30 per cent above their design capacity. They have achieved an availability of over 90 per cent in each of the last two years.

The nuclear power stations based on the Calder Hall type, once commissioned, have performed with similar reliability, and Hunterston, the latest to achieve full power, is, within two months of the second of the two reactors being commissioned, already achieving an output of electricity seven per cent above its design capacity.

Once commissioned, any difficulties experienced by nuclear power stations have arisen not from the nuclear part of the installation, but from the conventional side, boilers, turbines, and so on; difficulties which have also been experienced with the more advanced conventional power stations.

The fuel used in the Calder Hall type reactors has shown remarkable reliability, and the Atomic Energy Authority recently announced that it

was able to increase the period for which it was prepared to guarantee this fuel by one third, an important contribution to the economic return.

The prototype of the more advanced type of gas cooled reactor has now been in operation at Windscale for well over a year. There are 33,000 fuel elements in this reactor. On an average, they have reached a third of their design life, some of them are already half way there, and not one has failed.

The experimental fast breeder reactor at Dounreay has now been operating at its full design power for over a year. It seems certain now that this type of reactor, which can use the plutonium bred in the large gas cooled reactors, will be technically successful on a large scale.

Similar success stories can be told of different type of reactors in other countries.

In the decade in which nuclear reactors have been built and developed, there has been only one accident involving any hazard to the public. This was the Windscale accident in 1957, which involved one of the first two reactors of any size built in this country. Though, for a reactor accident, it was a serious one, the worst consequence was some contamination of milk in the area round Windscale.

Economic Aspects

Safety devices are now immeasurably improved, and one can claim that atomic power has proved its technical efficiency, safety and reliability. But the argument still rages about the economics, and this is fanned by the competing claims of different national types of reactors, American, Canadian and British.

I shall not go into what is a very complicated subject.

A White Paper published a few months ago said "detailed studies show that nuclear power is likely to have an economic place in the British electricity system in the early 1970s, and suggest that, thereafter, it will

become cheaper than conventional power for the generation of base load". This is certainly a competitor for the under-statement of the year.

My own view is that a number of Governments in highly industrialized countries, can, if they now wish, have electricity from nuclear stations from now on at a cheaper rate than that from any other source of energy. They can get this result from reactors now operating in experimental or prototype size, of three or four different types, if they order them on a sufficient scale, and are prepared to make the large initial capital outlay. Moreover, the main types of reactor now under development give similar economic results within the margin of error.

But the argument really turns on the pace at which nuclear energy should be introduced, and on the type of reactor most suitable for the conditions in different countries, rather than on whether nuclear power is a good thing, and on this basis I can turn to the specific question of contamination and safety problems.

Excluding the possible hazards of the release of radio-active elements, to which I shall return in a moment, a nuclear power station has great incidental advantages over conventional power stations. There is no release of smoke, grit, dust or of sulphur dioxide. This last substance is the subject of a special report this year by the Technical Committee of your Society, and I need not, therefore, dwell further on its disagreeable properties.

The relative cost of nuclear fuel is low, the quantity required is small, and problems of transport, for example in cold weather, are eliminated. If Hunterston were a coal fuel station, it would need 73,000 tons of coal per month; as a nuclear station it requires a few tons a month of nuclear fuel, which can be brought in a single lorry.

Once a station is built, the disturbance caused to the surrounding countryside is negligible, and when the present stringent siting restrictions are relaxed, nuclear stations, which

will in future be of smaller dimensions, can be placed much nearer to the main industrial centres, with saving of transmission costs.

When gas refrigerators were put on the market in the United States, I remember an advertisement which read: "Your goldfish makes more noise than a gas refrigerator". An analogous statement could be made in respect of nuclear power stations.

There remains, therefore, the question of the hazards of radiation.

Hazard Controls

Partly as a result of the association with atomic fall-out, and partly because it apparently introduced a new hazard to mankind, the controls which have been exercised over the atomic energy industry have been much more stringent than those which have been exercised over any other industry in the development stage. They are, for example, much more stringent than those which have been imposed on the chemical industry.

The controls are based on recommendations of the International Commission on Radiological Protection, which, on the advice of competent authorities in this country, are converted into rules and regulations binding on the atomic energy industry. The levels which are set in these regulations are extraordinarily rigorous. In parts of India and in Brazil, the population is regularly subject to levels of radiation from three to eight times that which is permitted in this country. To give two small examples, water discharged from radiation laboratories and installations in the Thames valley, is required to be purer than the water into which it flows. Anybody who regularly eats two brazil nuts a day will exceed the yearly intake of a radio-active material Radon 226 prescribed by the International Commission. Similar restrictions are imposed on releases to the atmosphere.

The enforcement of these stringent standards in comparison with the enforcement of standards of other

types of pollution, is simplified because radio-active materials can be detected and accurately estimated at very low concentrations by relatively inexpensive instruments. Not only are the controls extremely strict, but the methods of supervision are easy and accurate.

The same drastic type of controls are imposed on the siting of nuclear reactors. These were drafted originally so as to provide a safeguard against what was called "the maximum credible accident", and it will be immediately apparent that if anybody regulated his life on such a principle he would never even get out of bed.

An enormous amount of research and development has gone into making nuclear reactors safer than safe, and there is now every assurance that the effects of even the most violent and improbable failure in a nuclear installation would be contained within the building in which it is situated, and that there would be no release of radio-activity to the atmosphere. Of course, this type of hazard is not the only circumstance controlling the siting of nuclear power stations, but the loosening of the siting regulations would give more flexibility in the solution of a troublesome problem for the generating authorities.

I am not saying that all these regulations, when they were first drafted, were too stringent in relation to the knowledge and experience available at the time, but the risk is that the controls are rapidly becoming unnecessarily onerous and restrictive in the light of the accumulation of experience and the rapid advance of technical knowledge. It takes a very long time, sometimes years, to pass the legislation, to translate the legislation into orders, to train officials to administer them. Even now the last of the regulations has not been promulgated. We all know that once a code of rules has become embedded in the files and in administrative practice the need for the particular type or level of regulation may have gone by,

yet the effort to amend them is often thought to be too great, or if made, takes a similarly long period.

Proper precautions and a system of control will always be needed, but I think there is certainly a risk that the development of the peaceful applications of atomic energy for the benefit of the people of this country, and many other countries, may be handicapped by an albatross of regulations which, as it turned out, need never have been hung round its neck, and which bureaucratic inertia may make it impossible to cut away.

Continual awareness and willingness to modify the atomic energy regulations in the light of experience are needed if such an outcome is to be avoided.

Other industries have been less harassed, partly because their kind of pollution is less easy to measure, and its effect less easy to demonstrate than in the case of atomic energy, partly, too, because public opinion is not normally so acutely aroused by the indirect effects of smog, smoke and so on, as by the idea of radio-activity.

So my message to you is: "If you want to have cheap power with clean air, go nuclear".

On this clarion note, I have great pleasure in declaring this Conference open.

Shrewsbury Borough Council has asked the Ministry of Housing to revoke a smoke control order for the town on the grounds that residents are unwilling to burn hard coke and there are insufficient supplies of other smokeless fuels in the area.

Smokeless Pets

The idea that people without coal fires in smokeless zones should put pets in the living room, so that they can have something to watch, is put forward by Dr. Philip Weyman, M.O.H. for Heanor, Derbyshire, in his annual report. He advises people to try a fish tank, mice, hamsters, or other creatures in the sitting room as the focal point in the absence of a fire.—*Sheffield Telegraph*.

AIR POLLUTION, BRONCHITIS AND LUNG CANCER

Report on North East England Survey

Report on a study of Environmental Factors Associated with Lung Cancer and Bronchitis Mortality in Areas of North East England. By A. J. Wicken and S. F. Buck, Health Surveys Unit, AGB Research Ltd. Research Paper No. 8, Tobacco Research Council, Glen House, Stag Place, London S.W.1.

This report presents the findings of a statistical study of lung cancer and bronchitis deaths during the eleven years 1952-1962 inclusive in two urban and four rural areas of North East England. It confirms with significant new data the findings of previous investigations that air pollution is likely to be an important explanation of the much higher mortality from these diseases in the urban areas. Furthermore, it shows bronchitis mortality in these areas as being more strongly associated with air pollution than with any other factor studied, including smoking habits. In the case of lung cancer it indicates that the strongest of the associations studied is with smoking habits and the next strongest with air pollution. The report adds that more than statistical evidence is required to draw conclusions about the underlying processes which give rise to these associations.

The investigation was inspired by the Health Committee of the Urban District Council of Eston near Middlesbrough which was concerned at the apparently high mortality rate from lung cancer and bronchitis in the area. It was carried out by Mr. A. J. Wicken and Dr. S. F. Buck of the Health Survey Unit of AGB Research Limited and was supported financially by the Tobacco Research Council. For purposes of comparison, similar data were obtained for another industrial area, Stockton-on-Tees, and for the four rural districts of Croft, Northallerton, Richmond and Stokes-

ley. This involved seeking interviews with the relatives of the 1,376 persons who had died of lung cancer or bronchitis in the period, and with those of an equal number who had died of other diseases. Interviews were obtained in 87 per cent of these cases. In addition, information about the occupation, smoking habits, etc., of the living population was obtained by more than 4,000 further interviews.

Among a number of other findings one of special interest is that both at Eston (where physical measurements of air pollution were made) and at Stockton, the mortality rate for both diseases was markedly higher in the more industrialized half of the town.

(See also editorial comment.)

Review

Clean Air Law

Clean Air—Law and Practice. By J. F. Garner, LL.M., and R. K. Crow, B.Sc., F.A.P.H.I. 385 pp. Shaw & Sons, London, 63s.

This volume replaces the 1957 book, by Garner and Offord, on clean air law. Although described as a second edition, it has been so expanded that it should be regarded as a new work. It is to be warmly welcomed as the only detailed and comprehensive textbook on the subject. It is comprehensive because it not only gives full notes and annotations, section by section, of the Clean Air Act, 1956, but because it deals in the same way with the Alkali Act and Regulations, the Road Traffic Act (in respect of pollution) all the relevant sections of the Public Health Act, 1936, and has references to numerous other statutes that have a bearing on

the subject of clean air. Moreover, it contains in full all the regulations and Government memoranda and circulars on clean air that have been issued since 1956.

We suspect that we shall not be alone in almost purring with pleasure at having all this material together in one well-produced and well-bound volume, instead of having to refer to possibly incomplete files of dog-eared originals.

On first examining a new book on a technical or legal subject that is in a far from static condition a first question that one asks is "How up-to-date is it?". Here the authors and publishers have scored another success. It is up-to-date and it *does* include section 95 of the new Housing Act, with notes, and the full text of the Ministry Circular on this, 49/64—which we are able to review only in this present issue.

A feature of the book, which will

be appreciated particularly by public health officers, are the seven chapters that describe not only the provisions of the law, but give much essential and practical administrative and technical information and advice. Here one can detect the hand of Mr. Crow, backed by his wide experience. (He was one of the joint authors of that paper on "The Warwickshire Clean Air Council: An Exercise in Co-operation", read at the Society's 1963 conference at Scarborough.)

All that we miss from the book is consideration of the peripheral matters that relate to Scotland, and of the new Northern Ireland Clean Air Act. This will however not affect the great majority of readers, and will indeed do little to lessen the value of the book to those communities.

The book has an excellent index, full tables of statutes and statutory instruments, and even a list of relevant B.S.I. standards.

Wider Air Pollution Control Powers for Leeds

In August last the Minister of Housing and Local Government made an order transferring to Leeds City Council the control (hitherto exercised by his Alkali Inspectors) of smoke, grit and dust from certain industrial processes in their area.

The order, which is at the request of the Council, came into effect on September 21. It transfers control over smoke, grit and dust from the Kirkstall and Whitehall Road power stations and from three ceramic works. The Minister has decided to exclude from the order the much larger Skelton Grange power station, a ceramic works operating a salt-glazing process, and iron and steel, lead, aluminium, benzene, gas and coke works.

Under the Alkali, etc. Works Regulation Act, 1906, air pollution from a wide variety of industrial

processes is controlled by the Minister's Alkali Inspectors. The processes registered for this purpose are in the main those giving rise to pollution problems which are unusually serious, or the prevention of which is technically difficult. The Clean Air Act, 1956, which among other things gave local authorities powers to deal with industrial smoke, grit and dust generally, placed on the Alkali Inspectorate the responsibility for dealing with smoke, grit and dust from processes registered under the Alkali Act. But it gave the Minister power to make orders which have the effect of transferring this responsibility to local authorities.

The Minister takes the view that the transfer of control should at present be limited to the largest local authorities, employing experienced staff with the appropriate qualifications. Where control is transferred, he thinks that it should usually be limited to smoke, grit and dust from processes involving fuel combustion, and should only exceptionally include processes involving problems of chemical engineering.

DR. RUDOLF LESSING

We were only able to include a brief note in our last issue on the death, on September 2, of Dr. Rudolf Lessing. He was, as he liked to put, the Society's "oldest inhabitant", and his passing marks the breaking of the last link with the early days of the Coal Smoke Abatement Society in London. He became in effect the Society's technical adviser in 1908 and his active interest in the work of the Society continued unbroken until his death. He acted as Honorary Secretary to the first International Smoke Abatement Exhibition in London in 1912, and was one of the founders of the Committee that initiated the measurement of air pollution—the investigation that is now on a national basis under the D.S.I.R.

His professional work as a consultant chemist, and as an authority on fuels, enabled him to give a valuable service to the clean air movement, and he was appointed to the Government Committee on Air Pollution under Sir Hugh Beaver in 1953. He was a pioneer and untiring advocate for the cleaning of coal, especially as it was one means for reducing sulphur dioxide, on which Dr. Lessing was also an authority and enthusiast. The flue gas washing process used at the Fulham Power Station before the war was developed by him from the laboratory stages.

He was Chairman of the Society's Technical Committee for many years and was elected President in 1956, the year of the Clean Air Act. He was to the end a member of the Executive Council.

Dr. Lessing was born in Germany in 1878, and was educated at the Gymnasium Bamberg and the Universities of Munich, Geneva, Berlin and Manchester. On coming to this country he first held a research studentship at Owen's College. From 1903 to 1906 he was Research Chemist with the Gas, Light and Coke Company, Beckton, and in 1907 became Chemist and Engineer with the Mond Nickel

Company. He was the founder, in 1914, of the Hydronyl Syndicate Limited, of which he became the Managing Director and later Deputy Chairman.

Dr. Lessing married in 1912, and our sympathy is extended to Mrs. Lessing and their daughter.

DR. JOSEPH ROBINSON

We regret to record the death, at the age of 85, of Dr. Joseph Robinson of Stretford. A medical practitioner in the town for many years, he was also an M.Sc. in engineering and a member of the local council for more than 40 years. He was a former Mayor of Stretford and had been created a Freeman of the Borough. He was an ardent supporter of clean air, a member of the Society and the representative of his town at many of its conferences and also at meetings in the North West.

L. CLEGG

We also with regret have to record the recent death of Mr. L. Clegg, M.B.E., Chief Engineer of the National Industrial Fuel Efficiency Service. He had for many years an intimate knowledge of fuel utilization problems and before joining N.I.F.E.S. in 1954 was with the Fuel Efficiency Branch of the Ministry of Fuel and Power. He was keenly interested in the industrial aspects of clean air and was one of the joint authors of a paper read at the N.S.C.A. Conference at Scarborough in 1963.

Minister's Reply

The new Minister of Housing and Local Government, Mr. Richard Crossman, gave his first Press Conference on October 28. This took place at the Ministry in Whitehall and was very well attended by press representatives—including one from this journal. Asked whether he intended to encourage local authorities to speed up their smoke control programmes under the Clean Air Act, the Minister replied: "We shall encourage them".

THE CLEAN AIR ACT AMENDED

Section 95 of the Housing Act, 1964

The new arrangements for smoke control areas, described in Circular 69/63, of the Ministry of Housing and Local Government, have necessitated some changes in the Clean Air Act itself. As these relate to dwellings only the opportunity was taken by the Minister to include the required amendments in the Housing Act, 1964, where they are to be found in Section 95. A full commentary on the section is given in Circular 46/64 issued by the Ministry in August last.

There are nine subsections, which may be described (though in less detail than in the Circular) separately. (The figures below refer to the number of each subsection.)

(1) New Dwellings

Under the Clean Air Act a "new dwelling" was ineligible for grant for conversion of appliances required to conform with smoke control area regulations. A new dwelling was defined as one on which erection began after the date of the passing of the Act, namely July 5, 1956. The new Act amends the date to August 16, 1964, the date on which Section 95 came into force. (A building added to or converted to produce a new dwelling is included.)

The reason for this is that in areas where open fire smokeless fuel is or may become scarce, it may be necessary, when a smoke control area order is made, to replace open fires in post-1956 dwellings by alternative smokeless methods. The subsection has no retrospective effect, so that grants will be payable only on conversions made on or after August 16, 1964.

New building regulations are under consideration by the Minister of Public Building and Works, and will include a replacement of the present building byelaws made under s.24 of the Clean Air Act. The effect will

be to make new dwellings begun before August 16, 1964, ineligible for grant under the Clean Air Act, and Circular 46/64 states:

"Pending the making of a regulation it is important to ensure as far as possible by administrative action that any such dwellings likely subsequently to be so covered should be equipped from the outset with suitable appliances. With that object the Minister of Public Building and Works is therefore asking those local authorities who contemplate further measures of smoke control in their districts to draw the attention of builders to the content of the proposed regulation and to make it clear to all concerned that grant under the Clean Air Act will not be payable on any adaptations that may subsequently be found necessary in "new dwellings" as redefined in subsection (1)."

(2) and (3) Designation of Appliances

Circular 69/63 lays down that before making a smoke control order a local authority should consult fuel suppliers about the present and future availability of smokeless fuels in the area. If the supply of any fuel is likely to be insufficient the authority must by resolution designate appliances suitable only for such fuel as being unsuitable for the area. Subsection (2) provides that when this is done a grant shall not be payable for such installations. This of course applies particularly to open fires that may be suitable only for fuels that are in restricted supply. The subsection requires that a resolution designating a class of appliance shall be passed before the order is advertised, and in the Circular authorities are advised to give it due publicity.

As an alternative procedure, the Minister is empowered under subsection (3) to designate classes of appliances that are in his opinion unsuitable "as placing undue strain on fuel resources", either locally or generally.

This designation of appliances concerns only grant; there is nothing to prevent a householder in any smoke control area installing what appliance he wishes at his own expense. The Circular mentions that the Minister has under consideration the form of designation to be made in relation to direct heating electric space heaters.

There is a proviso that approval for grant by a local authority will not be affected by any subsequent designation of the appliance by the Minister.

(4) and (5) Approval of Expenditure—Special Cases

It is difficult to paraphrase or summarize the wording of these two subsections, and the annotation given in the Circular may therefore be quoted in full:

“Subsection (4) gives local authorities a discretionary power to approve retrospectively for grant purposes expenditure which, after the Ministry has confirmed an order but before it comes into operation, an owner or occupier incurs without the local authority's prior approval. It has generally been held that under the proviso to section 12(1) of the Clean Air Act local authorities have hitherto had no power to approve expenditure in such cases.

“Subsection (5) gives local authorities a discretionary power to approve for grant purposes after the Minister's confirmation of a smoke control order expenditure which an owner or occupier incurs after the local authority has made the order but before the Minister has confirmed it. Hitherto expenditure incurred before the date of confirmation of an order has under the proviso to section 12(1) been ineligible for grant.

“Subsections (4) and (5) apply only to expenditure incurred on or after August 16, 1964. They do not apply to expenditure which was incurred on installing appliances of a class designated by the Minister under subsection (3) either when the expenditure was incurred or when retrospective approval is sought.

“Owners and occupiers should not be given any general encouragement to incur expenditure without the

local authority's prior approval in the period between an order being confirmed and its coming into operation. They should be warned against deliberately incurring expenditure after the making of an order but before its confirmation, since grant cannot in any circumstances be paid if confirmation is withheld. There will however no doubt continue to be hard or deserving individual cases where there has been genuine misunderstanding or there are other special considerations, and the subsections will enable local authorities to deal with these cases appropriately.”

(6), (7) and (8) Discretionary Grants

Under the Clean Air Act a local authority is bound to repay to a householder seven-tenths of approved expenditure on conversion, of which four-tenths is recovered from the Exchequer. In case of hardship, etc., more than seven-tenths can be paid to the householder, but the four-tenths from the Exchequer did not vary. The extra cost of such discretionary increased grant has therefore to be borne wholly by the local authority. Because of the higher cost of installations under the new arrangements, the new Act provides for a larger contribution to be made by the Exchequer in such cases. There is also an analogous provision in (7) for cases where the local authorities carry out works of adaptation under Section 12(2) of the Clean Air Act and decide to receive from the owner or occupier less than the three-tenths to which they are entitled.

(9) Grant on Means of Ignition

Under the Clean Air Act grant could be payable for means of ignition of solid fuels only if “works” were involved. The new subsection provides that provision of means of ignition is an adaptation eligible for grant whether it involves work or not.

According to a report in the *Northern Echo* Stockton will have nothing to do with smoke control areas until something is done first about industrial air pollution in the district.



The Harrogate Conference

All Round Success

IT is customary to hear, from at least a few delegates, that a conference had been "the best ever", but after Harrogate this year this view was expressed far more frequently and earnestly than ever before. And perhaps not without reason. The attendance to begin with—1,024—was the biggest since the International Conference of 1959 (when there were also 200 overseas delegates); the programme was one of the most important for a long time; the social visits and ancillary events were varied and popular, and the Exhibition was a first-class show.

The conference had a fine start—which is always important—at the opening session on Tuesday when the Mayor of Harrogate, Councillor H. S.

Hitchen, gave us a speech that in quality and the way it was expressed was miles above the routine civic welcome. It was warmly appreciated by the delegates. Then came Lord Sherfield to open the conference, pinch-hitting as he put it, for a Minister. The contents of his address needs no gilding in these comments—readers who did not have the good fortune to hear it need only turn a few pages to read it in full. The meeting learned much from the address and clearly enjoyed it. Finally, on this morning of the opening session, there was the Presidential Address by Dr. Albert Parker. This, it must be confessed, had seemed rather tightly packed with arguments and figures for easy listening, but the subject was one of direct concern to most delegates and it was put over in Dr. Parker's engaging way, so that it became the third hit of the morning.

Above: the platform at Harrogate during the opening session, with Lord Sherfield speaking

The afternoon session was of necessity quite different, with eight regional reports on the smoke control situation. The reports, which had to be taken as read, represented a labour of love by the divisional representatives who had prepared them. The discussion on them was opened by Mr. Winfield, and after him comment came thick and fast. Delegates must have learned much both from the reports and from each other.

On the Wednesday morning the papers on air pollution and town planning by Dr. Craxford and Mrs. Weatherley, and by Professor Page, were well received, as they deserved, and stimulated thought in an important field where air pollution considerations should play a much more important part.

On Thursday morning came one of the star sessions of the conference—the four papers on the future supply situation of the smokeless fuels, coal, gas, electricity and oil. The four speakers, Mr. Frank Wilkinson (coal), Sir Henry Jones (gas), Mr. C. T. Melling (electricity) and Mr. E. Rendall (oil) were leading authorities from their respective industries and one felt how gratifying it would be if a session at this level could be arranged for every conference. The hall was packed on this occasion, a large influx of visitors coming in and it was estimated that there were at least 1,400 present.

The Des Vœux Lecture

Thursday afternoon was another notable occasion: the Des Vœux Memorial Lecture, given by Dr. J. S. Carter. Again, for the remarkable quality of this paper we need only to say—read it. Nor need we repeat the brief appreciation of Dr. Carter that appears in an editorial. He had agreed to a discussion following the Lecture and as those who were present will recall, this was well worthwhile.

Finally, on Friday morning attention was switched to quite different subjects—road vehicle pollution and sulphur dioxide. For the first there was a valuable paper by Mr. H. D. Fawell



The Mayor of Harrogate, Councillor H. S. Hitchen, speaking at the opening of the Exhibition

of the Ministry of Transport, and for the second the Technical Committee's report was presented by its Chairman, Dr. J. S. G. Burnett.

Much of the success of the sessions was of course due to the very capable chairmen—Dr. Parker, Mr. Cohen, Mr. Goodfellow, Mr. Turner and Mr. Cayton. Also helping, perhaps unnoticed, were the voluntary stewards and those responsible for the efficient display of the speakers' names on a board. Not to forget, of course, the discussion speakers themselves, the quality of whose contributions, as more than one delegate has told us, goes up from year to year.

The Frills

There were enjoyable social occasions—the informal gathering on the eve of the conference; the always enjoyable civic reception in the Royal Hall, and the new venture, a conference luncheon which was attended by just 200 and was regarded as a very pleasant and successful experiment that should be repeated. And then, on



Mr. Spencer Moppett (SSFF) and Dr. Parker presenting the Golf Trophy to the winner, Mr. R. H. Normand (C.S.I., Dunfermline C.C.)

the side line, so to speak, were the newly instituted conference Golf Tournament (with a cup presented by the Solid Smokeless Fuels Federation), the works visits to the Billingham Group Heating Scheme, the I.C.I. in the same area, and to the Park Gate Iron and Steel Works at Rotherham. In the evenings were opportunities to hear a David Kossoff show, and to see a play at the Opera House with an interval during which prizes were distributed to the charming young ladies who had won the first three prizes in the "Design a TV Storyboard" competition, on a clean air theme, which had been organized by the Society and the special West Riding Publicity Committee set up to promote interest in the exhibition in the area.

The schoolchildren entering for the competition were not large in numbers, but their efforts were commendable and showed much imagination and appreciation of clean air. A second competition, for visitors to the exhibition to judge the merit of the storyboards, which was open to adults (including delegates) was very popular—thanks to the generous prizes that had been donated—and over 1,000 entries were received.

The exhibition itself, like the conference, can probably be described with truth as "the best ever". The quality of the stands and the material exhibited was very high and most attractively presented. That the exhibitors were satisfied is shown by the fact that already three-fifths of the space for the next exhibition, at East-

Miss Sheila Kennedy, who presented the prizes (centre), with Mr. E. J. Winfield, with the TV Storyboard competition prize-winners—(l. to r.) Miss Susan Robinson, Miss June Mellor and Miss Jennifer Creek



bourne in October 1965, has been booked!

It hardly needs to be stressed once again that one of the objectives of the Society is to secure publicity for the cause of clean air, nor to point out that one of the functions of the conference is to secure such publicity and public discussion. The publicity received for the 1964 conference was exceptionally good, possibly another record, despite the distractions of the political events, and altogether—including the sulphur dioxide report published just before the conference, well over 500 press cuttings have been received. In addition to this there were a number of radio and TV news reports and interviews.

ERNEST SIMON

Ernest Simon of Manchester. By Mary Stocks. 188 pp. Manchester University Press, 25s. net.

Mary Stocks' biography of Lord Simon of Wythenshawe is pre-eminently a contribution to the extensive literature dealing with the radical tradition one associates with Manchester.

To readers of *SMOKELESS AIR* Ernest Simon will be remembered best as an active worker for clean air in the north-west. He attended a meeting on smoke abatement in February 1910 and expressed the view that "reform is practicable and would be of the greatest value" in a letter written at that time. A year later he was honorary secretary of the Smoke Abatement League in Manchester which was then encircled by spouting factory chimneys with the exception of a breathing space to the south. Mary Stocks describes the black deposits remaining after fogs and the sun "achieving an unearthly shimmer as though seen through dark glasses" on those all too infrequent occasions that it shone.

Smoke abatement was Ernest Simon's first important incursion into the sphere of public administration.

He had felt for some time that he could take time off from the two family businesses built up by his father, now merged into the Simon Engineering Group and an honoured name in the sphere of grit, dust and fume arrestment.

The Manchester City Council appointed an Air Pollution Advisory Board in 1913 and as its first Chairman, his enquiries and research embraced both the industrial and domestic sphere. When in 1914 the Government appointed a Departmental Committee on Smoke Abatement, he found himself involved in an official enquiry which was to be the first of many. His accumulated experience was summed up in the book "The Smokeless City" written in collaboration with Marion Fitzgerald and published by Longmans Green in 1922 during his year of office as Lord Mayor of Manchester.

The Wythenshawe housing project "where people would be housed in the midst of delightful surroundings and in such a position that the prevailing south-westerly winds would prevent the smoke and fumes from Manchester and Stockport from polluting the air" was made possible by Ernest Simon's purchase of Wythenshawe Hall, with its 250 acres of parkland. The property was presented to the City of Manchester without conditions and provided a superb cultural and recreational centre for the inhabitants of the houses that were to be built up around it.

Brief reference is made to his Chairmanship of the Fuel and Power Advisory Council whose important report on Domestic Fuel Policy earned him the gratitude of the whole clean air movement. He became President of the National Society for Clean Air in 1948 and it is interesting to recall that at the 1949 Conference his presidential address reviewed the history of the campaign against domestic smoke. In this address he maintained that "we may look forward with reasonable confidence to the end of the smoke nuisance as a whole by 1978".

Electric Power Progress

New C.E.G.B. Report

**Central Electricity Generating Board:
Annual Report and Accounts, 1963-4.
H.M.S.O., 12s. 6d.**

The British public have a seemingly insatiable thirst for electric power which is expected to increase from a demand for 30,000 megawatts in 1960-61 to over 66,000 megawatts by 1970-71. The annual report of the C.E.G.B. is not merely an account of the stewardship of a nationalized industry, but the vivid story of the efforts being made to satisfy this thirst.

At the end of 1964 the Generating Board's 233 power stations in England and Wales had a maximum output capacity of 33,157 megawatts (nearly 45 million horse-power) and in the near future 2,000 megawatt power stations will be erected at Wylfa in Anglesey, Cottam and Ratcliffe in Nottingham, Fawley in Hampshire, Tiddlers Ferry in Lancashire, and Didcot in Berkshire.

New power stations will be sited adjacent or close to their source of fuel and existing stations are now being supplied more economically as a result of improved methods of rail transport. Ash residues from pulverized fuel provide a disposing problem amounting to 7,000,000 tons—expected to rise to more than 10,000,000 tons by 1970. Their disposal is now resulting in a contribution to social amenities instead of the dead loss of moving a waste by-product. Worked out clay pits at Peterborough will be filled with pulverized fuel ash, topsoiled and restored to agricultural use. At Gale Common, near Knottingley, where mining subsidence threatens the value of land to agriculture, it will be discharged into artificial lagoons, further layers will be added one on top of the other to create an artificial hill which will be moulded and contoured

to resemble a natural feature in the landscape.

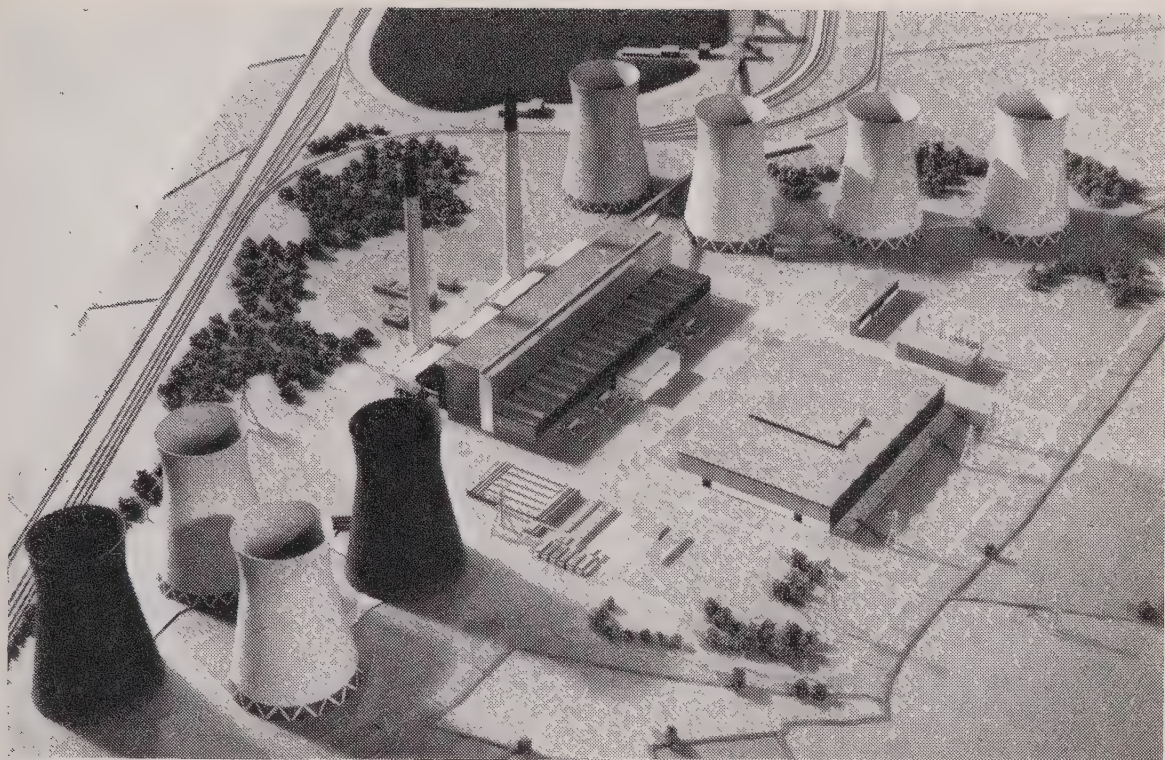
Members of the Society will recall Sir Keith Joseph's reference to electricity generation in the course of his address to the Annual General Meeting. He said, "Power stations produce very little smoke indeed—I don't blame citizens for not being able to understand this; it is our fault for not making our progress more clear to them". The annual report of the Board contains these four paragraphs which should contribute to the spread of enlightenment regarding Power station chimney emissions:

"In the investigation of methods of removing or reducing the sulphur dioxide content of flue gases, attention is being concentrated on dry absorbent techniques which, unlike wet scrubbing methods, do not destroy the buoyancy of the plume.

"In order to achieve satisfactory control over ground level concentrations particularly around large future power stations, it is important to understand the way in which plumes rise from power station chimneys and disperse in the atmosphere. Calculations based on theories of plume behaviours will be compared with the actual behaviours of plumes observed in a large-scale experiment at Tilbury where measurements of sulphur dioxide concentration at ground level are being made at distances of up to eight miles.

"Another approach to the complex problem of plume behaviours involves the use of scale models. Bristol University research workers, under contract from the Board, are examining the feasibility of simulating atmospheric conditions in a low speed wind tunnel.

"Regional research organisations are also investigating flue gas dispersal; in the Midlands Region sulphur dioxide recorders around High Marnham power station are



Model of the West Burton, Notts, Power Station

continuously monitoring ground level concentrations under all weather conditions. The South Western Region are investigating factors controlling the visibility of plumes from oil-fired stations. Certain threshold values of atmospheric humidity and background cloud, traces of sulphur trioxide and microscopic ash particles appear to be significant."

Where the Annual Report describes the Board's development plans reference is made to the apprehension about the effect of 2,000 MW. capacity power station chimney emissions on health and the importance attached to the public health aspect of new installations. The general conclusion of the Medical Assessor in the Ratcliffe enquiry report is quoted:

"After consideration of the existing knowledge of the medical effects of atmospheric pollutants, and of the concentration of pollutants which would reach ground level from the proposed power station at Ratcliffe-on-Soar and be superimposed on the existing levels of atmospheric pollution in the area I am of the opinion that the power station emissions would not add any appreciable hazard to the health of the surrounding population".

and goes on to say, "These conclusions

are of major importance to the cause of Clean Air. It had already become accepted that the potential hazard from air pollutants lies not so much in the total quantity emitted as in their concentration in the air close to the ground. Large power stations are now accepted as producing concentrations at ground level no greater than those from smaller industrial installations burning only a fraction of the quantity of fuel. The progressive transfer of the nation's consumption of primary fuel from small individual installations to large central power stations with tall chimneys thus makes a positive contribution towards the solution of the air pollution problem".

The accounts do not show the actual cost of measures taken to achieve clean air but it is significant that expenditure on research now runs at £4,012,835 per annum. Nuclear power stations will be completed at Dungeness, Sizewell, Oldbury and Wylfa to augment the excellent performance of the reactors at Bradwell and Berkeley and it is to be regretted that the accounts do not deal with the debit and credit of nuclear power generation or for that matter hydro electric operation.

The N.C.B. Reports

Further Rise in Productivity

National Coal Board Report and Accounts, 1963-64. H.M.S.O., 5s. 6d. net.

The Coal Industry Act, 1962 altered the financial year ending on the Saturday nearest to December 31 to that ending on the last Saturday in March. The report and accounts for 1963-64 therefore cover the fifteen month period from December 30, 1962 to March 28, 1964. To facilitate comparisons with previous years, separate results have been included for twelve months ending March 1964 with corresponding figures for 1962.

For the second period in succession, the Board has operated without loss. In the twelve month period productivity has increased by 7 per cent and sales reached 200 million tons during the year. Rise in production and increased administrative efficiency has enabled the Board to absorb increased wages costs of £16 million, and increases for materials, power and other charges of £10 million without increasing the price of coal, which for the greater part of the Board's output has remained constant for four years. meeting interest charges of £52.9 Aftré million, providing £7 million to the obsolescence fund, and setting aside £12½ million towards the difference between historic and replacement costs of fixed assets, the Board has been able to break even.

The Report lays stress on the necessity of maintaining sales in the region of 200 million tons a year, since to allow production to fall below this would be to lose valuable capacity which would be extremely expensive to restore. Moreover, since the industry has to meet standing charges of £200 million a year the effect of spreading these charges over a lower output would inevitably lead to increased prices of coal. If marginal

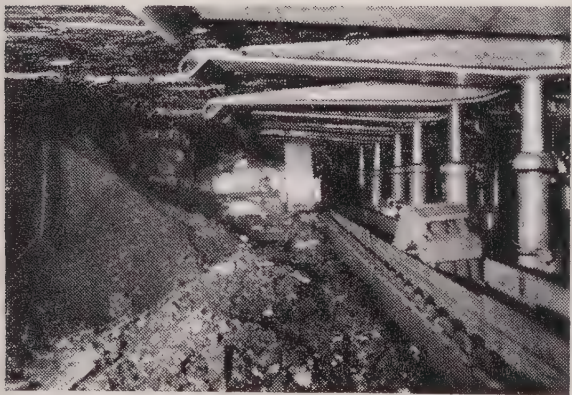
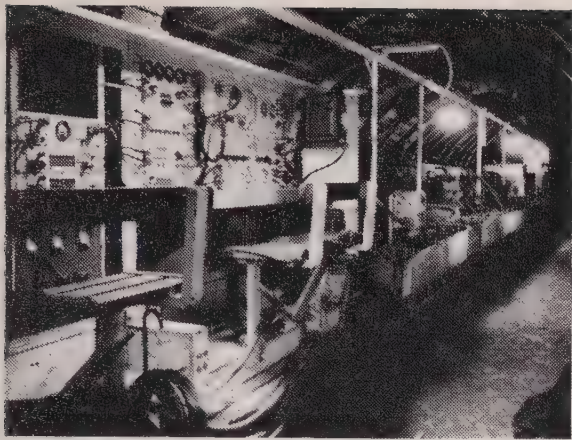
capacity could be utilized by increasing sales, reduction in coal prices might be possible.

During the fifteen months ending on March 28, 1964 the Board's collieries produced 237.4 million tons of coal, while 7.7 million tons were produced opencast, and 2.4 million tons came from licensed mines. During the twelve month period, the output was 0.4 million tons lower than in 1962, which was due to increased industrial activity and increased demands for fuel during the cold winter of 1962-63.

Underground mechanization has increased and 67.6 per cent of colliery output, compared with 58.8 per cent in 1962 was obtained by mechanized methods. Coalface production per manshift increased from 91.0 to 99.1 cwt. Production has been further concentrated in the more efficient collieries, while 40 were put out of action during the year.

During the twelve month period, 198 million tons were disposed of—to power stations 66.3 million tons, an increase of 9.7 per cent, to gasworks 21.8 million tons, a decrease of 1.3 per cent, to coke ovens 24 million tons, an increase of 2 per cent, to industry 25.3 million tons, a decrease of 7.7 per cent, to domestic consumers 25.7 million tons, a decrease of 10.2 per cent, miners' coal 8.3 million tons, a decrease of 7.4 per cent, to railways (excluding briquettes) 5.1 million tons, a decrease of 23.6 per cent, and to miscellaneous consumers 13.4 million tons. Exports including bunkers amounted to 8.2 million tons, an increase of 70.7 per cent.

Collieries made an operating profit of £66.7 million or 5s. 7d. per ton, opencast £6.3 million or 18s. 4d. per ton and coke ovens a loss of £6 million, or 24s. 8d. a ton of coke and on other activities including manufactured fuel a profit of £2.9 million.



Remotely operated Longwall Face—top photograph shows the complete mobile train of equipment, including the control console from which the face is operated. Below is a view along the face. (From the N.C.B. Report)

Capital expenditure mounted to £111.3 million of which £42.1 million was on major schemes and expenditure on research amounted to £6 million.

Smokeless Fuels

The Board is giving attention to the production of smokeless fuels for domestic heating, and in addition to 'Sunbrite', the sales of which in twelve months amounted to 1.1 million tons, and 'Phurnacite', the sales of which amounted to 820,000 tons, is producing a new fuel 'Homefire' for open fires, and in the South Eastern Division, a new type of briquette sold under the name of 'Kentish Fire'. The Board are thus increasing the types and quantities of solid smokeless fuels for domestic use and are helping manufacturers to provide more attractive and versatile appliances for their use. The Minister of Housing and Local Government

and the Secretary of State for Scotland have extended to the whole country the areas in which room heaters may qualify for a conversion grant. The Board is also giving attention to the development of domestic appliances to burn bituminous coal smokelessly.

The scheme for the installation of central heating systems based on solid fuel has been well supported and in 1963 over 200,000 partial and full central heating schemes were installed in domestic and small commercial premises, involving loans totalling more than £17 million.

The Approved Coal Merchants Scheme was extended in 1963 to cover boiler fuels. At the end of the year 7,440 merchants handling about 87 per cent of the total tonnage, satisfied the conditions required. Of these some 1,500 held also the technical diploma of the Coal Utilization Council. In March 1964 the scheme was extended to include smaller distributors unable to qualify as 'approved'. These will be known as 'authorized coal dealers'.

In conjunction with the Railways the Board is bringing up to date the pattern of railborne domestic coal distribution by concentrating the delivery of coal to fewer and larger depots to be served by regular scheduled trains from a colliery or marshalling yard. A fully mechanized station at West Drayton handles 200,000 tons of coal a year and 15 other smaller depots handling 300,000 tons came into operation.

The Board operates 58 brickworks, a salt-glazed pipe works and a refractory works. In fifteen months these produced 601.6 million bricks, 24,850 tons of pipe and refractory ware. These works made an operating profit of £356,000.

During the fifteen month period some 1,870 houses were built by local authorities in consultation with the Board and over 7,000 were under construction or negotiation. The Coal Industry Housing Association built more than 1,000 houses and more than 2,000 were authorized.

INTERNATIONAL SECTION

U.S.A.

NEW GRANTS FOR A.P. CONTROL

from Arthur C. Stern

U.S. Public Health Service

THE Federal air pollution programme of the United States Public Health Service has begun awarding grants-in-aid to municipal, regional, and State governmental agencies throughout the country to assist them in developing, establishing, or improving effective air pollution control programmes.

Early in November, more than \$830,000 in grant funds was awarded to agencies in ten States. The agencies had applied for Federal assistance under provisions of the Clean Air Act of 1963, which for the first time authorized the use of Federal funds to help meet the costs of developing and improving air pollution control programmes.

Under terms of the Act, municipal, regional, and State governments may receive Federal air pollution control grants to supplement their own financial resources. Agencies serving one political jurisdiction are eligible to receive up to two dollars from the Federal government for every one they contribute; agencies serving more than one jurisdiction—whether in the same or in different States—may receive up to three dollars for every one they contribute.

Under this grant-in-aid programme, Federal funds may be used in any of three ways: (1) to undertake a project leading to the establishment of a control programme; (2) to bring into operation a programme which has already been authorized by State or local law; or (3) to improve upon an existing programme. In any case, the agency, in order to be qualified for grant assistance from the Federal

government, must demonstrate that it has a workable programme for the control of air pollution within the entire area of its jurisdiction.

The current budget of the Federal air pollution programme includes just over \$4,000,000 to be used to aid local, regional, and State control programmes. Federal officials anticipate that approvable requests for these funds will exceed this amount before the present fiscal year is over. The Clean Air Act authorized an increase in grant funds for each of the next two fiscal years, but the Congress will make the final determination as to how much money shall actually be appropriated for this purpose. In the United States, authorization and appropriation of funds are two separate legislative actions.

The agencies receiving funds in this first group of awards are located in all sections of the country and their programmes range from highly developed air resource management activities, such as that in Chicago, to more modest programmes, like that being planned for the area around Greensboro, North Carolina.

Interest in the new grant assistance programme is demonstrated by the fact that more than 400 local, regional, and State agencies requested and received information and application materials in September, within days after the programme went into operation. The grants awarded in November were among those applied for in September. Federal programme officials plan to make grant awards early each month, allowing no more

than 60 days for review of applications and final determination on their acceptability.

MOTOR VEHICLE AND AIR POLLUTION

In the United States, as in most other technologically advanced nations of the world, the motor vehicle remains one of the major uncontrolled sources of air pollution. The contribution of motor vehicles to the contemporary urban air pollution problem is a subject of considerable conjecture and often wide disagreement among persons in government and in industry; and in fact, precise figures on the quantity and extent of vehicle derived contaminants in various cities of the United States are fragmentary.

There is broad agreement, however, that motor vehicles, and particularly private passenger cars of which there are some 80,000,000 in use in the United States, will have to be brought under some measure of control if the contemporary air pollution problem here is to be met fully and effectively.

Within the last several months, a number of significant developments have been reported which indicate, if not substantial progress toward solution of this problem, at least a marked increase in the efforts of government and industry to accord it more attention. The State of California, having adopted several years ago laws requiring the use of vehicle exhaust control devices or techniques when such equipment became available to the motoring public, last summer approved four air pollution control systems after extensive testing by the State Motor Vehicle Pollution Control Board. The devices, each of which is essentially a replacement for conventional components of the engine exhaust system, were developed by American manufacturers, in the chemical, machine tool, and automobile parts industries, not by the vehicle manufacturers themselves. Under California law, the approval of these devices requires virtually all new

cars registered in the State to comply with State exhaust gas concentration limitations beginning in the fall of 1965.

The automobile makers, speaking through their trade association, the Automobile Manufacturers' Association, announced previously (in March) that 1967 model cars would be modified at the factory so as to meet the California exhaust emission limitations. It is understood that the factory modifications will preclude the use of devices such as those approved by the Motor Vehicle Pollution Control Board.

These developments cast a cloud over the California State programme and dampened the interest of the manufacturers of the approved devices, at least one of which has indicated it now plans not to produce its control device. A subsequent announcement by the Automobile Manufacturers' Association stated that the industry would be able to provide cars which meet the California requirements by the 1966 model year (fall of 1965), or one year earlier than had been indicated in the March statement.

Of overriding importance in all these developments is the fact that control devices and/or factory modified automobiles designed to emit less air pollution will be available only in the State of California, since that is the only State whose laws regulate motor vehicle emissions. Neither the auto makers nor the manufacturers of motor vehicle control devices plan to make control devices and systems available outside California.

This factor is of special interest to the Federal government since, under the Clean Air Act of 1963, the Federal air pollution programme is charged with seeking means of achieving better control of air pollution produced by motor vehicles. The technical committee established under the Clean Air Act to explore this problem and recommend new approaches toward its solution (see *Smokeless Air* No. 131, Autumn 1964, p. 47) will shortly transmit its first report to the Secretary

of Health, Education, and Welfare. He, in turn, will report to the Congress in mid-December. There are indications that the Congress will consider the possible adoption of Federal legislation relating to the motor vehicle pollution problem. A special sub-committee of the United States Senate concerned with problems of air and water pollution is expected to issue a report shortly which may call for such legal action at the Federal level.

This year, the automobile industry expects to produce in the neighbourhood of 10,000,000 cars, a record number. This may be a notable year also as the one in which efforts to control vehicular pollution on a nationwide basis reach a climax.

Council of Europe

REPORT ON THE AIR POLLUTION CONFERENCE

The proceedings of the Strasbourg Conference on Air Pollution of the Council of Europe were reported in our last issue. We have just received a report (Document 1827), prepared by the Social Committee of the Consultative Assembly, which the Assembly recommends to the Committee of Ministers for action. Having examined the decision of the Committee of Ministers to set up an *ad hoc* "Committee of Experts" to find ways and means to follow up the conference, the Assembly recommends the Committee of Ministers to:

(1) grant the *ad hoc* committee the following terms of reference: "to determine, on the results of the European Conference on Air Pollution, to what extent and by what means the Council of Europe should contribute to the fight against air pollution";

(2) to support the idea that the Consultative Assembly should be represented in the *ad hoc* committee by a member of its social committees;

(3) to transmit to the *ad hoc* committee the proposals outlined below for further action. These suggestions should be regarded as constituting a programme of work to be carried out gradually.

Then follows the list of proposals, which are numbered (a) to (n). These are of some length, and we are able only to summarize them, as follows:

(a) *Health*—to co-ordinate research, standardize methods for observation and notation of symptoms.

(b) *Animals and Plants*—to develop and make experiments to lessen pollution effects.

(c) *Economic*—(i) to standardize statistics and other economic aspects and encourage investment in research and operation of anti-pollution devices, such as tax concessions. (ii) to investigate a common method of assessing pollution costs.

(d) *Danger Thresholds*—to fix orders of priority in dealing with harmful pollutants and devise standards for determining the chemical pollutants in the air.

(e) *Measuring*—to complete and produce a standardized glossary and vocabulary of terminology and units of measure.

(f) *Apparatus*—to standardize methods and equipment for international co-operation on measurements.

(g) *Meteorology*—(i) to encourage research on the influence of topographical and geographical factors on pollution dispersion; (ii) to compile and maintain European pollution maps; (iii) to establish liaison between national meteorological services.

(h) *Combustion*—(i) to collect statistics on European domestic fuel usage methods and methods for removing SO₂; to study emissions from different sources; (iii) to develop and co-ordinate research on air pollution; (iv) to list organizations dealing with these problems in different countries and consider short-term exchanges of specialized and inspection staff.

(i) *Motor Vehicles*—(i) to produce a documentation bulletin; (ii) to encourage and promote technical studies; and (iii) to study the preparation of vehicle pollution standards for vehicles passing from one country to another.

(j) *Industry*—(i) to examine prob-

lems of individual industries, exchange of information on techniques for reduction of pollution and consider common standards; (ii) to study exchange of inspection staff; (iii) to organize information exchange and facilitate contacts to avoid duplication of effort.

(k) *Town and Country Planning*—(i) to carry out regional and national studies; (ii) to gather and supply information for planning authorities and the public.

(l) *Co-operation*—(i) to examine studies and research in progress, promote co-operation and determine what studies should be carried out or continued and what bodies are best fitted to do the work; (ii) to make use of experience and resources of existing centres; (iii) develop co-operation, standardization, etc.; (iv) hold from time to time a European conference (every four or five years) for the guidance of Governments.

(m) *Information*—(i) to set up within the Council of Europe a permanent information centre which would publish a bulletin, keep card-indexes of publications and organizations, and prepare documentation for journalists, advise industrialists, establish film and photo libraries, assist national bodies, and help to organize European campaigns, etc. (ii) to list all bodies dealing with air pollution.

(n) *Legislation*—(i) to compare all European legislation and seek to harmonize it; (ii) to supply information to help governments to adopt legislation; (iii) prepare the text of a convention flexible enough to be acceptable to all member countries.

Then follows paragraph (4) of the recommendations, which states:

“To set up, within the framework of the Council of Europe, an inter-governmental co-ordinating committee entrusted with the task of carrying out, step by step, the programme outlined under point (3). This committee would comprise representatives of all the inter-governmental organizations interested in the campaign against air pollution. The committee, while endeavouring, for the sake of economy, to avoid duplication, should entrust the execution of the programme either to committees of experts already existing in other organizations or to inter-

governmental committees or sub-committees to be set up within the Council of Europe.”

The document concludes with a 30-page explanatory memoranda, by M. Radius, on the conference and the recommendations outlined above, which are based on the proposals of the 14 working parties whose reports made the principal feature of the conference.

(Note: The document described above was received just as this issue was being prepared for press, and it has not been possible to give it the analysis and critical review its importance merits. It is hoped to do this in our next issue. In the meantime it may be said that a first impression is that many of the proposals appear excellent in themselves, but that, if all were adopted, they would call for the creation of a very extensive secretariat, the enlistment of many highly trained executive staff, and substantial funds.—Ed.)

Norway

ROAD VEHICLE CONTROL

from Dr. Walter Lindberg

Institute of Hygiene, University of Oslo

The Director of Public Roads has issued a circular on new regulations for the control of road vehicle pollution. The regulations are as follows:

1. The emission of smoke from any type of motor vehicle engine is to be reduced as much as possible, and must, in diesel engines, not exceed a smoke number of 70, as measured with a Hartridge smoke meter.

The measuring of the smoke number shall be carried out when the vehicle is stationary, and with normal engine temperature. Before the measurements takes place, the engine shall be accelerated three times, as fast as possible, in order to remove accumulations of soot. The accelerations shall then be repeated three times, each time recording the highest scale reading on the smoke meter. The difference between scale readings should not exceed three units. If so, repeat the measurements until two readings in succession are within this limit of tolerance. The arithmetical average of the last two readings must not exceed 70.

2. The engine, and the combustion system such as carburettor, injection pump, nozzles, governor, ignition system, air and fuel filters, etc., shall be kept in such condition that the smoke emission does not exceed the limit value set in point 1.

3. In diesel engine vehicles the equipment for increasing fuel quantity at the start must not be used during the driving, or altered in such a way that it can be used after the engine has been started.

In a supplementary circular more detail is given about smoke meters, and it is advised that if a Bosch meter should be used a reading of 5.5 can be taken as equivalent to the smoke limit of 70 on the Hartridge meter.

Japan

Heat Control and Efficiency

Thanks to the Washington meetings in June friendly contact has been established with the Kanto-Shin-Etsu Heat Control Society of Japan, through its Chief Director, Mr. Takahide Taga. We have received issues of the Society's journal *Heat and Management*, and although the language barrier is a difficulty, an English synopsis of the contents has been gratefully received. For the August issue, for example, there are articles on *Recent Developments in Boiler Manufacture*, *Essentials of Conducting Heat Control Diagnosis*, and *A Method of Oil Consumption Management in Batch Type Heating Furnaces in Steel Works*. There is also a report of the Washington conference.

South Africa

CLEAN AIR BILL AND A SYMPOSIUM

from C. E. Latsky

CSIR Air Pollution Research Group

A draft Bill for the prevention of air pollution, made on the recommendations of a commission of inquiry in 1962, had originally four parts—for the creation of statutory bodies, for control of chemical emissions (very similar to the U.K. Alkali Act), for control by local authorities with by

law and smokeless zone provisions, and for the control of dust from (mainly) mine dumps. To these has now been added a Part V—for the control of road vehicle pollution, with powers to stop, prohibit, and require inspection to be made.

During the year the research work of the Air Pollution Research Group has continued with the support of 45 sponsoring bodies and a £4,000 grant from the Government. A Symposium on the implementation of air pollution control has been held during the year.*

The Durban Smell

An event of particular interest during the past year was the location by Dr. Halliday of a major source of the odour which became notorious as the "Durban Smell". This unidentified odour had been plaguing Durban North for several years and was a major cause for concern to the tourist trade as well as to the local residents. An initial report by the Air Pollution Research Group on the probable nature of this odour did not satisfy the

*A copy of the report of this Symposium has been received. It contains the following papers:

The Present Status of Research on Air Pollution, by Dr. E. Halliday.

The Control of Smoke Emission from Diesel-Engined Vehicles, by K. R. Johnson.

Measurement of Smoke and Sulphur Dioxide in Cities, by Dr. E. Kemeny.

A Survey of the Work of the Chamber of Mines on the Stabilization of the Surfaces of Mine Tailing Dumps, by Dr. A. L. James.

The Pamphlet Library and Information Service of the CSIR Air Pollution Group, by C. E. Latsky.

Chemical Measurements of Atmospheric Oxidant and Polynuclear Hydrocarbons in City Air, by C. W. Louw.

The Efficiency of a Smoke Vertical Boiler Run on Smokeless Fuel, by Prof. E. T. Woodburn and E. Du Plessis.

Chemical Engineering Aspects of Air Pollution Control, by W. G. B. Mandersloot.

The Air Pollution Bill and its Implications for Local Authorities and Industries, by Dr. E. Halliday.

civic authorities. They wanted the name and address of the offender. As a result of earlier work done in the Durban area, Dr. Halliday had formed a theory which he set out to test. This involved flying up the coast north of Durban in a light aircraft at the time when the smell was prevalent and at intervals opening an air scoop to sniff the atmosphere. In this way the odour plume was traced almost to its source, 55 miles north of Durban! It was found to be a pulp and paper factory. The works concerned has subsequently engaged the services of my Group in performing a micro-meteorological investigation of the dissipating power of the atmosphere in the vicinity of its two existing mills and at the site of a projected mill. A similar investigation is being carried out in anticipation of the effluent problems which may be associated with the establishment of a new petroleum refinery and an ammonium nitrate fertilizer plant just north of the Cape Peninsula.

REPORT FROM FRANCE

from G. Levantal

Association pour la Prévention de la Pollution Atmosphérique

Having been alerted through the good offices of the A.P.P.A., the French public authorities have admitted the necessity of effecting the formation of courses for police officers and constables and for sanitary inspectors, all of whom would have the task of exercising control over atmospheric pollution. For this purpose the National Institute of Public Health in Rennes organized the first session last February which was attended by about thirty students. The sessions will be continued and concluded in the Paris region. Papers were presented by authors with specialist knowledge, and the interest with which they were followed showed that they filled a real need.

Mobile Exhibition. The National Centre for Sanitary and Social Education, an organization attached to the Ministry of Public Health, has

organized a mobile exhibition on the subject of atmospheric pollution: sources, effects, detection, remedies.

This exhibition has already been shown in Rouen, Nancy, Lille and Strasbourg. Fifteen other towns will be visited successively during the period of a year.

Five Recent Decrees. The summer period has been marked by the publication of five decrees, all relating to the fight against atmospheric pollution.

1. A first decree concerning petrol engines and in force from April 1, 1965, requiring the return to the carburettor of the crankcase gases which at present are emitted outside on most of the models.

Owing to a new device with which the vehicles will be equipped for this purpose "the total amount of hydrocarbons present in the exhaust gases should not exceed 0.15 per cent of the weight of the fuel burnt".

2. Creation of special control zones in the Seine Department.

3. Use of heating appliances and fuel practice in the special control zones instituted in Paris.

4. Control of emissions from fuel plants in the special control zones instituted in Paris.

5. Miscellaneous regulations applicable to classified works situated within the special control zones in Paris.

These texts represent a new stage concerning the utilization of fuels for heating and smoke or gas emissions in Paris.

The action of the regulation in its most severe provisions (relating to the first zone) can be summed up in three points:

- prohibiting by stages the use of fuel oils most rich in sulphur, so that by October 1, 1967, only light domestic fuel oil should be used in all plant burning less than 1,000 therms per hour;
- prohibiting the use of certain categories of coal (greasy, non-smokeless briquettes, chars) except

in specially designed appliances; provisions to this effect will be subsequently made by way of technical instructions;

—boilers must be maintained and functioning in such a way that no visible smoke is emitted.

Calculated maximum thresholds have been determined regarding sulphur and smoke; they will be subject to control measures.

Thus an answer has been partly made to the repeated appeals of the A.P.P.A.

European and International Action

At the European Air Pollution conference, in the French Parliament, and in the various departmental and municipal assemblies, discussions have taken place on these problems.

At the Economic and Social Council, the following resolution, adopted last July, indicates what the French Government proposes:

- (a) that in the framework of the Council of Europe, the creation of a European Council for the study of air pollution, consisting of two representatives—one an expert—from each of the 17 member countries who will agree to participate effectively in these studies;
- (b) that the Council should be endowed with a permanent secretariat whose main task would be to gather, centralize and distribute to the participating nations, all kind of information concerning atmospheric pollution, as well as to prepare and to present a prevention charter against this pollution;
- (c) that the work of this Council should be effected in permanent liaison with the world organization of W.H.O.

This desire for rapprochement in a European framework has recently been extended to the United States in the form of an international union proposed last June and grouping for the present six independent associations for the prevention of atmospheric pollution. This would include the N.S.C.A. and the A.P.P.A.

GERMAN SULPHUR STUDY

Sulphur Oxides in Flue Gases and in the Atmosphere. By Spengler and Michalczyk. pp. 152. VDI-Verlag, Dusseldorf. DM 18.80.

The sulphur dioxide in waste gases of furnaces represents undoubtedly the most important air pollutant in highly industrialized areas and it is therefore very welcome that Prof. G Spengler, who is well acquainted with the literature on the subject, should examine in a penetrating way the problems concerning the formation and the removal of SO₂ from furnaces. From the explanatory point of view, the conciseness of the text makes a more detailed treatment desirable in some places, for instance when dealing with legal regulations on an international basis; in particular the rules applying to Germany should be discussed in more detail and brought completely up-to-date. The same applies to the considerations about the physiological effects of sulphur dioxide. A second edition to be published will offer an opportunity for doing this. The fact that while the main part of the work was being published, revision was already necessary and will be included in a first supplement, illustrates how much the questions connected with the removal of SO₂ from flue gases are still in a state of development.

The washing processes with the various chemical additives are all fully described, illustrating critically at the same time the growing trend in cleaning methods from absorption (washing), to adsorption (on solids). There is a comprehensive discussion of the dry removal methods, both with and without the use of catalytic agents, according to their oxidizing or reducing action. The comparative costs of the several mentioned suggestions for cleaning are most informative for practical application and clearly set out in a tabular form.

The *Queen Mary* is reported to have been fined \$100 for making too much smoke while docked in New York.

Gas at High Speed

Industry's New Report

The Gas Council: Annual Report and Accounts, 1963-4. H.M.S.O., 12s. 6d. net.

THE phrase "high speed gas" seems to be acquiring a second meaning. Not only does it suggest speediness in use, but the bewildering rate at which developments have been taking place in recent months, both in utilization and in production.

The new annual report records some of these, though to give a complete picture important postscript information must be appended to this review.

First, a few of the more important facts and statistics from the report. Gas sales increased over the previous year by 2 per cent, but allowing for temperature variations from the average the increase is 5 per cent. The new space heaters, which have transformed the public attitude to the gas fire, showed a 40 per cent sales increase compared with 1962-3, and totalled nearly three-quarters of a million.

Central heating installations went up by 60 per cent to 90,000.

On the financial position of the industry, each of the 12 Area Boards showed a surplus, totalling £9.6 millions, or twice the previous year's. Capital investment has gone up during the year and is expected for some years to come to keep to the new level of £90 millions a year. 2,500 miles of new mains were laid during the year.

Clean Air

The report discusses the part that has been played by the industry, as a producer of gas coke, in supporting the early stages of clean air policy under the 1956 Act. "But now", he adds "because of the rapid changes taking place in the methods and economics of gas production, a major increase in supplies of gas coke to support the future development of clean air can no longer be expected".



Looking from the end of the jetty to the storage tanks at the Canvey Island Methane Terminal

Nevertheless, it is mentioned later, "the Council has appointed a consultant to investigate the technical and economic aspects of operating continuous vertical retorts primarily as coke producers for the domestic market".

The New Processes

There are three new oil-based processes either in operation or soon to begin. These are:

The I.C.I. high pressure continuous catalytic reforming process, which is now being introduced by all the Boards.

The Gas Council Gas Recycle Hydrogenator, a new enrichment process reported last year, plants for which are being rapidly installed.

The Gas Council Catalytic Rich Gas Process (CRG). This is described below in a separate note.

Reference is also made to the

Lurgi Study Group of the Council and N.C.B., and to its conclusions that "the building of a large-scale Lurgi plant on the basis of the Study is not in the present circumstances justifiable on economic grounds". However, the industry's research into the gasification of coal is continuing.

The further important development, the importation of natural gas from the Sahara, is of course discussed in the report, and later progress—namely the arrival of the first cargo—is reported below. Reference is also made to the continuing search for natural gas in this country, and to the discussions with the Dutch authorities on the importation of supplies from the natural gas field recently discovered in the Netherlands. But not dealt with in this report is the part the Gas Council is now playing in the search for natural gas under the North Sea.

NEW GAS MAKING PROCESS

"Major Breakthrough"

The gas industry has developed what is described as a revolutionary new process, capable of making a methane rich gas direct from light petroleum distillate. It has been invented at the Gas Council's Midlands Research Station at Solihull by Dr. F. J. Dent and his team, and is known as the Catalytic Rich Gas process (CRG).

The gas is produced at high pressure, is non-toxic and with only a trace of sulphur. It is produced by the action of light distillate and steam on a nickel catalyst under pressure, and gives a gas of, 650 to 850 Btu, according to whether carbon dioxide is removed or not. The distillate has first to be purified and the sulphur content reduced to a fraction of a part per million. The gas can pass to a reformer to make town gas of lower c.v., or can be used to enrich lean gas from another source; or it can be converted to a gas interchangeable with natural gas.

The first commercial plant to make gas by the new process is now in operation at the Bromley Works of the North Thames Gas Board, and has an output of 4 million cubic feet per day. Other plants in various parts of the country are on order, ranging up to 60 million cu. ft. per day. The plants are being built by either Humphrey and Glasgow or by Woodall-Duckham.

The importance of this process, following the Gas Recycle Hydrogenator, is that it represents a major breakthrough in gas making technology by reason of the fact that a single basic process can be adapted to give a gas compatible with town gas as supplied today, or with natural gas, which is the standard in many countries abroad and may well be the gas of the future here. The Gas Council is convinced that the new process, which has a very low capital cost, will enable gas to be made which



The arrival of the first 12,200 tons of methane (NSCA Photo)

will be as cheap, or cheaper, than gas made by any other existing process or combination of processes.

There is as yet no fully worked out process for the manufacture of a similar rich gas from heavy oil or coal, but work on this is an important part of the programme at the Midland's Research Station.

NATURAL GAS ARRIVES

Monday, October 12, 1964, was very cold, and it seemed particularly cheerless and dark on the Thames at Canvey Island in the morning, when a company of journalists and other guests of the Gas Council waited to see the new ship *Methane Princess* loom into sight through the mist, carrying the first regular cargo of methane gas from North Africa to the great new terminal.

There were no flags flying, or other ceremonial gesture made to greet her, but it was all the same an historic moment in the story of Britain's hunger for fuel and power. The ship, as she came in, must have crossed the

course taken by some small wooden craft, seven or eight hundred years earlier, bringing the first cargo of coal from the north to London. And now gas, buried for countless ages under the sands of the Sahara, was being piped to the Mediterranean, cooled and compressed to liquid form, shipped to Canvey Island, and then, as gas again, was being sent by pipeline to London, Manchester, Leeds and other distant destinations.

The terminal itself is an 85 acre complex of pipes, storage tanks for the liquid gas, a gasholder, and all the ancillary plant and offices of a great new undertaking. Its jetty stretches 750 feet into the Thames, to water deep enough for even larger vessels to anchor.

Pipelines take the methane from the ship to the terminal, where it is stored in five tanks, each of 4,000 tons capacity. From these it is pumped to evaporators for reconversion to gas by heat exchange with sea water. The warmth of the water at ordinary temperatures is sufficient to vaporize the liquid. The gas is then delivered, with a calorific value of 1,100 Btu into

the grid pipelines at a pressure sufficient for delivery purposes.

The nerve centre of the operation lies in the Canvey Control Room. One man regulates the methane flow along the pipelines to the distribution points in the separate areas. There is a round-the-clock shift in one large room from which the controller may place a direct call to any of the Area Boards to give warnings of any change in the flow. The Boards also have direct access to the control room. There is an elaborate system of signals, warning and alarms to keep the flow of the gas under strict control throughout its long journey. Other controls give a continuous picture of all that is happening at the terminal itself.

The Ships

There are two ships on the methane run; the *Methane Princess* and the *Methane Progress*. They are identical and are the first commercial methane tankers in the world. They were designed by Conch International Methane Ltd. 618 feet in length, they have a service speed of $17\frac{1}{4}$ knots, contain three insulated holds, each with three methane tanks. The capacity of the tanks is 12,200 tons, or 173,000 barrels of liquefied gas.

The tanks are of aluminium and are heavily insulated to maintain the cargo just under the boiling point of methane, -258°F .

Each of the ships cost $\pounds 4\frac{3}{4}$ millions to build and together they will make 60 round trips a year from the Algerian terminal at Arzew to Canvey Island. They will deliver about 700,000 tons of liquid methane, or around 10 per cent of Britain's present gas consumption.

One felt, as, shivering a little in the cold wind at the end of that long jetty, as the *Princess* came into sight, that this was the beginning of something of immense potential value to the economy of Britain and—to look at it from our special point of view—a powerful new source of entirely smokeless, entirely sulphurless, energy.

REPORT FROM N.I.F.E.S.

The 1963-64 Annual Report of the National Industrial Fuel Efficiency Service (71 Grosvenor Street, London, W.1) includes a survey of the first ten years' progress of the Service. It is a record of successful endeavour in promoting fuel efficiency in the many sectors of industry that have needed it. In so doing N.I.F.E.S. have done much to promote smokeless combustion and their activities have in fact greatly aided the implementation of the Clean Air Act.

Contributions amounting to $\pounds 336,831$ were received during the year from the fuel industries, but as a period of guarantee has now ended these may be reduced in future years. Fees and charges for services are however increasing, and for the year amounted to $\pounds 277,831$.

One figure from the record of the ten years' work will be of interest to many of our readers. That is, during the decade 7,077 boiler operators received their training through N.I.F.E.S.

The report contains a number of recent case histories, which make most interesting reading. In a number of instances the Service was called in to assist in reducing smoke, dust or grit, and in one case, objectionable odours. This was due to a process for the recovery of waste rubber and gave rise to dense plumes of visible vapours and to disagreeable odours which, it was said, was "a source of worry not only to the company but to its neighbours and the local authority". The problem was tackled by re-designing the sprays that were intended to suppress vapour discharge, but this did not eliminate the odour. However, with the aid of a local chemical consultant a suitable burning-out furnace was installed. The result was that operation of the plant has completely eliminated the discharge of objectionable odours and "both the company and the local public health authorities have expressed their satisfaction with the performance of the installation".

The Sulphur Dioxide Report

A copy of the Report on "Sulphur Dioxide as an Atmospheric Pollutant", by the Society's Technical Committee, is available on request to any member or appointed representative. To others copies may be obtained at 2s. each, and quantities may be ordered at 16s. per 12 copies, or £6 per 100. It is hoped that local authorities in particular will order copies for distribution to their committees or councils. The report, which is discussed on page 99, is a 32-page booklet, and for readers who have not seen it—and to place it on record in this journal—we give below the eight conclusions that form the final section.

The Conclusions

1. Sulphur dioxide is an atmospheric pollutant that should be reduced as far as may be practicable because of its effects upon health and its economic cost through corrosion and injury to plant life.
2. The means for reduction or prevention of emissions include the greater use of sources of heat and power that are free from sulphur or contain only an insignificant amount. These include hydro and nuclear power, towns gas and the lighter grades of oil. Evaluations of the merits of these sources, made for economic, fuel policy or general social purposes, should always include recognition of the part they can play in reducing sulphur dioxide emissions.
3. The continued use of sulphur-bearing fuels, namely coal and its solid derivatives and the heavier grades of oil, is unavoidable, and only limited amounts of the sulphur are removable before the fuels are used. Much coal is cleaned to remove from it a useful proportion of the inorganic sulphur content, and some further advantages would be gained by the cleaning of small coal that is at present untreated. Some of the original sulphur present in crude oil is removed during refining and under present practice both virtually sulphur-free fractions and sulphur-bearing heavy oils are sold. The removal of sulphur from the latter would be expensive and although it cannot at present be urged, it is hoped that economical methods of doing this may be developed and put into commercial use.
4. The removal of sulphur dioxide from flue gases by wet washing processes is of limited application and has certain disadvantages. There appear to be possibilities in passing the hot gases through a dry absorbent or by other means and investigations are in progress and should be pursued. It must however be stressed that any such removal process is likely to be applicable to large installations only.
5. So long as combustion gases have to be emitted into the atmosphere the dispersal of sulphur dioxide and other flue gases by ensuring their discharge at a high level, making use of high chimneys, exit velocity and temperature, is reasonably effective and is essential. The greater the volume of gases being discharged, the more important is it to design chimneys to give satisfactory dispersion. This need should not be subordinated to architectural and landscaping considerations. If the latter are of paramount importance the building should be equipped with heat or power installations that do not require chimneys.
6. Important reductions in sulphur dioxide emissions can be secured by improved methods of burning fuel, so that less is required for any given purpose. Where there is a

greater demand for heat or power because of increased production, or for greater warmth in the home, such improvements may at least prevent an increase in the amount of sulphur dioxide discharged.

7. The above point is particularly important in respect of domestic heating, in which the products of combustion are discharged at low level and are at their maximum during the coldest months of the year. The more efficient heating methods now required for smoke control areas, and becoming increasingly popular, either eliminate or substantially reduce sulphur dioxide emissions from domestic chimneys and they should therefore be encouraged in every way both for this and for other reasons.
8. In areas of high building density, when it is considered that sulphur dioxide emissions may in certain circumstances build up to hazardous

concentrations, it is particularly important to ensure proper chimney design and height and that sulphur-free or low-sulphur fuel or energy only should be used. In areas being newly developed or redeveloped, more careful consideration should be given to the atmospheric conditions that will eventually be experienced, and this should be a factor in planning the heating systems to be used and also the height and layout of buildings.

In conclusion, it may again be emphasized that the problem of sulphur dioxide in the atmosphere is one that calls for a variety of contributory solutions. It is also apparent that there is no prospect in the immediate future of entirely eliminating this gas, but that, through the means that have been indicated, much can be done to reduce the total emissions and to reduce its concentration in the air we breathe.

Smokescreen over Sulphur

With acknowledgements for permission to reproduce, we give below in full the leading article from the Yorkshire Post of October 12, mentioned on page 99. It sums up the essence of the SO₂ problem in a most admirable way, is a tribute to the Society's report and very effectively debunks the fallacies of what it aptly calls the Sulphur Dioxide Sect.

DISCIPLES of the smoke abatement movement have long been harassed by what might be termed the Sulphur Dioxide Sect. These are the people who from time to time ridicule the Clean Air Act of 1956 for its failure to come to grips with the problem of sulphur dioxide gas, a harmful constituent of the combustion products stemming from our chimneys and motor exhaust pipes.

Why bother to check the black smoke when the real villain is slipping through the net goes the argument? Without denying the harmfulness of this gas, the pollutants which are dealt with by the Act are well worth removing in the interests of health and amenity.

The sad truth of the matter, as is

made clear in a report by the Technical Committee of the National Society for Clean Air, is that there is no single, comprehensive panacea for sulphur pollution. Indeed, the experts can see no prospect of entirely eliminating sulphur dioxide from our atmosphere so long as we have to rely so heavily on coal and oil for our sources of heat and power.

The publication of this report a week in advance of the Society's conference in Harrogate is a most sensible move. Explaining in plain words the nature of this complex problem, breaking it down into its component parts and indicating the possible lines of attack on each, the report should effectively disperse some of the fog surrounding the problem.

(Concluded on page 135)

SMOKE CONTROL AREAS

Progress Report

POSITION TO OCTOBER 1, 1964—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,491	49
<i>Acres</i>	328,732	14,711
<i>Premises</i>	1,793,432	108,193
Smoke Control Orders		
Confirmed	121	6
Submitted	116	7
Grand Totals	1,772	63

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Autumn, 1964), which gave the position up to July 1, 1964. They now show the changes and additions to October 1, 1964.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the ministry of Housing, but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control Areas in Operation

Tyneside and Wearside
Jarrow B. No. 2.

West Riding (North)

Aireborough U.D. Nos. 14 and 16,
Baildon U.D. No. 1, Bingley U.D. No. 11,
Dewsbury C.B. No. 5, Heckmondwike
U.D. No. 4, *Huddersfield C.B. No. 6,
Huddersfield C.B. No. 7, Knottingley U.D.
No. 6, Leeds C.B. Nos. 40 and 41,
Ossett B. No. 8, Shipley U.D. No. 3,
Spenborough B. No. 5, Wakefield C.B.
No. 7.

Derby, Nottingham and Chesterfield
Beeston & Stapleford U.D. Nos. 4 and
5, Sutton-in-Ashfield U.D. No. 1.

North Midlands

Leicester C.B. Nos. 10 to 12.

County of London

Deptford M.B. Nos. 5 and 6, Fulham
M.B. No. 8, Hackney M.B. No. 8,
Kensington M.B. No. 7, Lambeth M.B.
Nos. 7 to 11, Lewisham M.B. Nos. 16
and 17, St. Marylebone M.B. No. 7,
Shoreditch M.B. No. 6, Wandsworth
M.B. No. 5, Westminster M.B. Nos. 14
and 15, Woolwich M.B. No. 19.

Outer London

Acton B. No. 8, Barnes B. No. 4,
Beddington & Wallington B. No. 4,
Carshalton U.D. No. 4, Dagenham B.
No. 5, Dartford B. Nos. 5 and 6, Ealing
B. Nos. 15 and 16, Feltham U.D. No. 4,
Finchley B. No. 9, Friern Barnet U.D.
No. 5, Hendon B. Nos. 8 to 10, Heston
& Isleworth B. Nos. 7 and 8, Kingston-
upon-Thames B. No. 4, Leyton B. Nos.
3 and 4, Malden & Coombe B. No. 5,
Merton & Morden U.D. Nos. 4 and 5,
Richmond (Surrey) B. No. 5, Southgate
B. No. 4, Sutton & Cheam B. Nos. 1 and
2, Twickenham B. No. 3, *Walthamstow
B. No. 8, Wanstead & Woodford B. No. 5,
Wimbledon B. No. 3, Wood Green B.
No. 6.

South Lancashire and North-East Cheshire

Ashton-under-Lyne B. Nos. 2 and 5,
Manchester C.B. No. 10.

Central Lancashire

Preston C.B. No. 8.

West Midlands

*Birmingham C.B. No. 85, *Brierley Hill U.D. No. 15, *Coventry C.B. No. 5, Darlaston U.D. No. 1, Dudley B. No. 6, Smethwick C.B. No. 6, *Solihull B. No. 4, Stourbridge B. No. 19, Sutton Coldfield B. No. 2, West Bromwich C.B. Nos. 12 and 13, Wolverhampton C.B. Nos. 4 and 5.

Potteries

Stoke-on-Trent C.B. No. 14.

Bristol

*Bristol C.B. No. 7.

Local Authorities outside the Black Areas

Barnet U.D. No. 5, Basildon U.D. No. 2, Glanford Brigg R.D. No. 2, Gloucester C.B. No. 1, *Heanor U.D. No. 1, Old Fletton U.D. Nos. 4 and 5, Peterborough B. No. 1, Potters Bar U.D. No. 1, Slough B. No. 6, *Southampton C.B. No. 2, Wortley R.D. Nos. 5 and 6.

New Orders Confirmed but not yet in Operation*Tyneside and Wearside*

*Sunderland C.B. No. 6.

West Riding (North)

*Bradford C.B. No. 5, Halifax C.B. No. 8, Horsforth U.D. Nos. 14, 17 to 19, Keighley B. No. 5, Rothwell (Yorks) U.D. No. 7, Sowerby Bridge U.D. No. 1.

West Riding (South)

Sheffield C.B. No. 5, Swinton U.D. No. 6.

County of London

Battersea M.B. No. 4, Bermondsey M.B. No. 6, Greenwich M.B. No. 6, Westminster M.B. No. 16.

Outer London

Brentford and Chiswick B. No. 5, Carshalton U.D. No. 5, Croydon C.B. No. 6, Ealing B. No. 18, Hendon B. No. 11, Ilford B. No. 6, Kingston-upon-Thames B. No. 5, Malden & Coombe B. No. 6, Merton & Morden U.D. No. 6, Southgate B. No. 5, Tottenham B. No. 5, *Wimbledon B. No. 4.

South Lancashire and North-East Cheshire

Audenshaw U.D. No. 3, Chadderton U.D. No. 6, Cheadle & Gatley U.D. No. 6, Droylsden U.D. No. 9, Oldham C.B. No. 6, Rochdale C.B. No. 6, Salford C.B. No. 10, Stretford B. Nos. 5 and 6, Urmston U.D. No. 3.

Central Lancashire

Blackburn C.B. Nos. 4 and 5, Burnley C.B. Nos. 5 and 6, Colne B. No. 4.

Merseyside

Bootle C.B. No. 6, Wallasey C.B. No. 10, Widnes B. No. 4.

West Midlands

Dudley C.B. No. 7, *Halesowen B. No. 22.

Local Authorities outside the Black Areas

Brentwood U.D. No. 4, Cheshunt U.D. No. 4, Hemel Hempstead B. No. 4, High Wycombe B. No. 12, *Hornchurch U.D. No. 6, Scunthorpe B. No. 5, Slough B. No. 7, Thurrock U.D. No. 3.

New Orders Submitted for Confirmation but not yet Confirmed*Tyneside and Wearside*

Gateshead C.B. No. 6, Jarrow B. No. 3.

West Riding (North)

Halifax C.B. Nos. 9 and 10, Horbury U.D. No. 2, Horsforth U.D. No. 21, Mirfield U.D. No. 6.

West Riding (South)

Sheffield C.B. No. 16.

County of London

Finsbury M.B. No. 5, Fulham M.B. No. 9, Hackney M.B. No. 9, Kensington M.B. No. 8, Paddington M.B. No. 6, Poplar M.B. No. 16, St. Marylebone M.B. No. 8, St. Pancras M.B. No. 6, Woolwich M.B. Nos. 20 and 21.

Outer London

Beddington & Wallington B. No. 5, Chislehurst & Sidcup U.D. No. 3, Edmonton B. No. 7, Finchley B. No. 10, Heston & Isleworth B. No. 9, Mitcham B. No. 3, Richmond (Surrey) B. No. 6, Wanstead & Woodford B. No. 6, Wembley B. Nos. 10 and 11.

South Lancashire and North-East Cheshire

Manchester C.B. No. 9, Middleton B. No. 10A, Stalybridge B. Nos. 7 and 8, Whitefield U.D. No. 7.

Merseyside

Liverpool C.B. No. 17.

West Midlands

Birmingham C.B. Nos. 107 to 111, Brierley Hill U.D. Nos. 16 to 19, Wednesfield U.D. No. 6, West Bromwich C.B. No. 14, Wolverhampton C.B. No. 9.

Potteries

Kidsgrove U.D. Nos. 8 and 9.

Local Authorities outside the Black Areas

Barnet U.D. No. 6, Basildon U.D. No. 3, Chatham B. No. 7.

SCOTLAND

Smokescreen over Sulphur (*Concluded*)

New Smoke Control Orders in Operation

*Barrhead No. 1. (Arthurlee), Coatbridge (Kirkshaws), Dumbarton Burgh No. 5. *Edinburgh (Corstophine No. 2.) Glasgow (Shettleston and Tolleross), Motherwell & Wishaw (English Street), Stirling County (Stenhousemuir No. 2.)

New Smoke Control Orders Confirmed but not yet in Operation

*Edinburgh (Corstophine No. 4.), Midlothian County (Livingston New Town Designated Area No. 1.)

New Smoke Control Orders Submitted but not yet Confirmed

Glasgow (Cathcart Nos. 1 and 2.) Glasgow (Pollockshaws No 2.) Renfrew Burgh No. 1.

There are numerous ways in which the effects of sulphur dioxide emission can be minimized or ameliorated. These include the installation of more efficient heating systems and the erection of high chimneys and it is inexcusable that the pollution factor should evidently be ignored so often in the planning of new or re-developed areas.

Perhaps, as a result of this report, some of the energy generated by the Sulphur Dioxide Sect will be more constructively directed. The backroom boys are fully aware of the problem but help is required in implementing the lessons already learned.

Summary of Smoke Control Progress

As at September 30, 1964

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
†Northern ..	13,950	11.1	65,430	11.8
East and West Ridings ..	73,635	19.6	272,095	23.3
North Midlands	16,175	6.0	59,860	11.7
‡Greater London	119,695	36.6	1,121,135	42.5
North Western	81,760	20.4	369,455	21.7
Midlands ..	36,010	14.5	172,985	16.5
South Western	5,050	19.2	18,105	12.2
Wales and Monmouthshire.. ..	45	0.01	650	0.2
Totals ..	346,320	16.5	2,079,715	25.3

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (*e.g.* there may be some areas of open country).

† Gateshead No. 5 order withdrawn. Sunderland No. 6 areas reduced in size.

‡ Bermondsey No. 6 re-submitted July 21, 1964.

A Century of Achievement

by

J. S. Carter, C.B.E.*

The Des Vœux Memorial Lecture, Harrogate Conference

IT was about one hundred years ago that public opinion in Britain began seriously to be alarmed at the growing pollution of the air by acid gases from the steadily developing chemical and metallurgical industries and by the damage these gases were causing. In 1862 a Select Committee of the House of Lords was appointed to inquire "into the injury resulting from noxious vapours evolved in certain manufacturing processes and into the state of the law relating thereto." After taking evidence the Committee made their Report during the same session of Parliament. They found that great injury to vegetation, including trees, hedges, corn, grass and garden produce was caused by various manufacturers, the chief offenders being alkali and copper works. They expressed no opinion on the effects of these vapours on human life or health. They reported that "as unhappily, no means have yet been devised of neutralizing the effects of the vapours evolved during the manufacture of copper consistently with the carrying on of this important branch of industry" they did not recommend that copper works should be made the subject of special legislation. The "vapours" from copper works, usually referred to in contemporary writing as "copper smoke" were the oxides of sulphur evolved during the complicated processes for recovery of copper from copper sulphide ores. With respect to alkali works (the roasting of common salt with sulphuric acid in the first (saltcake) stage of the Leblanc

process for alkali manufacture) the Committee felt that means for dealing with the acid gases existed and in due consequence there appeared the first Alkali Act of 1863. This matter is treated in some detail in Appendix V of the 1963 Alkali Report—the centenary report.

So much for acid emissions. There was, however, then and for many years thereafter an almost benumbed public acceptance of not merely dark, but often of frankly black smoke as an unavoidable consequence of industrialization. But for the persistence of an angry and determined handful of reformers, amongst whom I am pleased to record the early chief alkali inspectors, this state of affairs could have gone on indefinitely. In the first part of this paper there is set out the smoke position as it was and the improvements which have occurred. As authorities I have the published reports of my predecessors, the valuable reports on effluvium nuisances made to the Local Government Board over the years 1875 to 1878 by Dr. E. Ballard and the Reports of Government Committees with the record of the evidence submitted to them.

First of all, however, an attempt to outline the general position in the 1870's. Priority is given to Dr. R. Angus Smith, the first chief alkali inspector. "Is it not true that those coming into Widnes, even from very dark and gloomy skies, enter that town with a certain awe and horror and wonder if life can be sustained there. . . . Persons told me that when they went to take up their residence in Newcastle they looked from that

*Chief Alkali Inspector (now retired),
Ministry of Housing and Local Government

great high-level bridge on to the Tyne and cried in a kind of despair at the banishment from the south-west, which if not always sunny, is at least always supplied with clean air" (Alkali Report 1875/6). The Tyne came in for some adverse comment in the Report of the Royal Commission on Noxious Vapours, 1878. "When the Commissioners were on the banks of the Tyne they observed a canopy of black smoke almost everywhere." Nor was the London region sacrosanct as the Royal Commissioners reported: "From numerous witnesses resident in Blackheath, Greenwich, or the neighbourhood we received serious complaints of the nuisance and intense annoyance caused by the offensive smells which proceed from the works grouped on the banks of the Thames. . . . The offensive and nauseating character of their combined odours was attested beyond dispute . . . by our own observations." The Royal Commissioners also received evidence from the Archbishop of Canterbury on the effect of acid fumes received at Lambeth Palace from the salt-glazing of earthenware nearby. Knives and forks rusted before he could use them and the bindings of books in his library disintegrated. His Grace, as did others, drew attention also to the "atrocious smells" from a nearby candle factory and the adjoining "manure wharves". The Royal Commissioners confirmed this and with appreciable tact described it as the "peculiar odour which we perceive on travelling by the South-Western Railway between Vauxhall and Waterloo". Nor did the south-west, eulogized for its clean air by my predecessor, escape for the Royal Commission reported: "A deputation from a public meeting held at Plymouth laid evidence before us as to the nuisance to which residents within a radius of a mile from Plymouth are exposed." Anyone still hankering after a return to the good old days should be completely cured by reading that part of the Plymouth evidence concerning what could euphemistically be termed as back-ground odours. The particular facet

concerns "the town dung hill" containing some thousands of tons of "the sweepings and emptyings of everything that is vile" and with "pigs nuzzling up and devouring tit-bits". This is inserted not for the purpose of being evocative of Rabelais, but so that we can be properly appreciative of what sanitary engineers and public health officers have done for us in the meantime.

As to how local authorities and industry viewed the unhappy stalemate concerning black smoke is well shown by that part of the evidence heard by the Royal Commission concerning salt works. The Northwich local authority summed up the result of their many prosecutions as "Heavy fines, and no improvement as regards the quantity of smoke emitted". The spokesman for the salt industry when asked what measures he was taking to reduce black smoke replied "None whatever. I have caved in, and the local authority must fine me as long as they can; and if they fine me to too great an extent, I shall have to shut up. That will be the case with all of us". The attitude of many industrialists was given to the Royal Commissioners by Mr. H. H. Vivian, M.P., a South Wales industrialist. "You cannot have manufactures carried out without suffering these disabilities: half to two thirds of your incomes is derived from manufacturing industry and you must take the rough with the smooth".

There is a timelessness about the nuisance potential of the Thames-side cement works. When the Royal Commission investigated and when production was about one-tenth of what it is today, the trouble was not dust (this came later with the rotary kiln) but smoke and fume. The Royal Commission reported that emissions seriously impeded the navigation of the Thames and that they had received a memorial to this effect by upwards of 130 London Trinity pilots and upwards of 50 steamship masters trading to the port of London. One skipper testified that the smoke crossed the river in such clouds that he

could not see the bowsprit end of his ship. Dr. Ballard devotes considerable space to these cement works and their emissions and states that as a result of legal proceedings several were then working under an injunction.

The bulk of the Report of the Royal Commission deals, however, with the chemical, metallurgical and general industrial emissions in the industrial North and in South Wales. The problem here was essentially that of the broad belt of devastated land rendered useless for farming around these works. This aspect is considered in the second part of this paper.

GENERAL INDUSTRIAL SMOKE

The Report of the Departmental Committee on Smoke and Noxious Vapours Abatement set up in 1920 under the chairmanship of Lord Newton contains the sentences "But perhaps the chief factor in the failure to deal with the smoke evil has been the inaction of the Central Authority. No Government has, for many years, taken any action with the exception of appointing committees, whose labours have led to little or no result". This seems to me somewhat unfair to the Central Authority, for in matters such as this Governments can advance no further than public opinion is willing to follow them and it needed the London smog disaster of 1952 to alarm the general public sufficiently for the Clean Air Act, 1956, to reach the statute book. Yet even when the Newton Committee was reporting and when conditions were accepted which would not now be tolerated, there was already major progress to record in the industrial field as the following extracts from my predecessors' published reports show.

"Complaints . . . against the emission of black smoke are numerous, but too intermittent and desultory to bring about much diminution of the evil. . . . It is a curable evil and therefore ought to be cured. In order to purge the air of our manufacturing

districts of its black soot, to remove the pall of smoke which shuts out the sunlight and enfeebles both animal and vegetable life, pressure is needed from outside: a determination on the part of the public that the evil shall cease" (1885).

He was in gloomier mood the next year. "It is possible by the exercise of care in the construction of furnaces, and skill on the part of stokers to prevent or very greatly to diminish the emission of black smoke in almost all cases . . . yet the evil continues and the law is not enforced, owing one must say to apathy on the part of the public and a consequent want of persistent effort on the part of the manufacturers. The occurrence of black smoke is so universal in the manufacturing districts that both the public and those who administer the law look on it as an institution too firmly established to be safely attacked. A case occurring in a northern county came lately under my knowledge, where the chimneys of a single factory threw out dense black smoke in such enormous volumes as completely to darken the sky and shroud a portion of the landscape in gloom. Some of those living in the neighbourhood made formal complaint but no redress was obtained. . . . London has the character of being still a smoky city, and so it is, but no smoke is seen there comparable in blackness with that which pervades many towns in Lancashire and Yorkshire . . . in this respect the palm must be given to the chimneys of cotton mills and some iron works" (1886).

Yet in the same report is printed a letter from the chief engineer of the Manchester Steam Users' Association in blunt, north-country speech and the following extract is indeed worth quoting. "Smoke has been shown to be a curable evil . . . over and over again but nothing or next to nothing has been done to bring it to an end, and in my opinion nothing will be done until the prevention of smoke be made compulsory by Act of Parliament and the Act vigorously and judiciously worked. . . . I do not

consider that it would be any hardship whatever to render it compulsory that all boiler owners should prevent smoke. . . . If a firm and explicit Act were passed rendering it compulsory to prevent smoke no difficulty would be found in complying with it, and the wonder would then be why the nuisance had been so long endured”.

This letter would appear to have encouraged my predecessor for next year he wrote much more forthrightly “In my last two annual reports I drew attention to this subject. I brought forth abundant testimony from engineers and others in support of my assertion that the production of black smoke could be prevented. . . . It cannot be doubted that if a competent authority were during three years, to enforce the observance of the laws prohibiting the emission of black smoke, the difficulties at first experienced would vanish and a material benefit would be experienced alike by the coal user and the public” (1887).

Public opinion was by now aroused and in the following year there appears this comment on black coal smoke “A feeling on the part of the public is apparently on the increase, that the evils arising from this source are great and should be diminished. This has been shown much in Manchester, Bolton and some of the principal smoke producing districts. The mortality in Manchester has lately been on the increase and people have not unnaturally considered that the dark panoply of smoke under and in which they live contributes largely to the evil. A voluminous correspondence has been carried on in the newspapers concerning it”. (1888).

Later comments are much more cheerful, the nadir was passed. “The efforts made to prevent or diminish the emission of black smoke from factory chimneys have been well continued during the past year. It is now becoming more fully acknowledged on the magistrate’s bench that the evil is to a large extent preventable; manufacturers have therefore been

pressed to improve their systems of coal burning, so as to inflict less evil on their neighbours in this respect. . . . An influential committee has been formed in Manchester for testing smoke preventing appliances”. (1889).

Finally the report for 1890 records real progress: “In my report last year, I referred to an organization started originally among some manufacturers and others in Lancashire, to ascertain by direct experiment what results were obtained in actual practice by the use of the best smoke-preventing appliances now offered. The movement has made great progress, and a public meeting, convened by the Lord Mayor, was held in its support at the Mansion House, London. One convened by the Lord Provost of Glasgow was also held in the Town Hall of that city, and similar meetings convened by the Mayors of their respective towns have been held in the Town Halls of Birmingham, Leeds, Newcastle and Sheffield, so that the movement may be considered a truly national one”. Public opinion was at last aroused and the series of legal and technical measures leading in due course to the industrial provisions of the Clean Air Act, 1956, became inevitable.

By 1921 the Newton Committee could report: “The evidence shows that under normal conditions, and with careful stoking, either mechanical or by hand, little or no smoke need be produced by boiler furnaces, and that in many cases it would be quite practicable without undue expenditure, very largely to reduce the amount at present emitted”. By 1921 progress in industrial smoke abatement was indeed such that it had become apparent that the earlier, excessive, black smoke emission had been masking an appreciable emission of grit and dust. The Newton Report states: “certain witnesses have stated in evidence that it is not practicable . . . to avoid the emission of grit”. The really great advance in the past quarter of a century has been in the field of grit and dust arrestment.

The arrestment of fine dusts and

especially of metallic fume was not so long ago an intractable problem. The usual method was the application of long flues. Some of these mentioned in the early reports of my predecessors extended a mile or more up hillsides using any cottage in the way as settling chambers. The maximum length was that at a lead works in Wales recorded in the Alkali Report for 1885, of three miles where in spite of this "yet a considerable amount of metallic fume passes from the top of the chimney". Yet the first indications of a solution were to hand for the same report mentions the experiments of Prof. Oliver Lodge, showing "that the passage of a stream of high tension electricity into the fume at once causes it to agglomerate and to deposit like flakes of snow", and states that the method will soon be applied to fumes from lead smelting.

The report for 1886 refers to these trials, the first recorded industrial application of electrical precipitation:

"Last year I drew attention to the experiments made by Prof. Oliver J. Lodge, D.Sc., on the deposition of dust by the aid of electric currents, and expressed a hope that the principles might be applied to the retention of solid matter thrown off as dust and fume in many manufacturing operations. Since then experiments on the large scale have been carried out by Messrs. Walker, Parker & Co., at their lead works in Flintshire, with a view to separate more fully the lead fume from the air passing along their flues and escaping from the chimney. A large Wimshurst induction machine, with four glass discs of 5 ft. diameter, was erected, and the currents of electricity carried from it to two wire gratings inserted a few feet apart in the main flue, the gratings being the size of the sectional area of the flue. It was hoped that the electricity in traversing the space between the gratings would cause a deposition of the dust or fume. This result has not, however, yet been attained, but we may hope that a continued study of the conditions of the problem will

reveal the causes of failure, and that in due time they may be surmounted."

The works were at Bagillt and the source of power a one horse power steam engine. The installation failed mainly due to the primitive method of producing high tension electricity.

Little more was heard of the industrial application of electrical precipitation until the 1914-1918 war when it was applied to blast furnace gas by the Skinningrove Iron Co. and to non-ferrous metal fume by Vivian and Sons, Swansea. The years following that war saw its application to a great number of dust and fume emissions. Of particular interest here is the first British application to boiler flue gases at Willesden Power Station in 1929. There were major and still growing applications after the 1939-1945 war. It is a basic and incontrovertible truth that but for the electrical precipitator, efficiently to de-dust the great volumes of flue gases involved, the present programme of electrical power production, perhaps the most important arch in the structure of our national clean air policy, involving as it does massive coal-burning power stations of 2,000 MW, would be impossible. Such stations will each consume four to five million tons of coal yearly, and when on full load at the rate of about 20,000 tons daily. As a matter of interest in 1903, the first year for which figures are available, the total national usage of coal for the production of electricity was but three million tons. At the present time about one-third of the coal raised here is burned at power stations and the amount is expected soon to be about one-half. This is in addition to production of electric power from oil and the nuclear power programme. The modern 2,000 MW fuel-burning power station, virtually smokeless, fitted with high duty electrical dust arrestment plant and with waste gases discharged via a 650 ft. chimney is indeed a considerable achievement in the field of direct and indirect reduction of smoke and grit emission. As a matter of interest, the total present cost of meeting clean

air requirements at a coal-burning 2,000 MW power station is about £3,500,000.

Also a notable achievement in its way is the publication "Clean Air Act, 1956; Memorandum on Chimney Heights" issued in 1963 by the Ministry of Housing and Local Government. This is without doubt the most straightforward and helpful of all publications with similar aim whether issued by government or scientific or industrial organisations. It has clearly cut a Gordian knot and there should now be uniformity in determining the height of industrial chimneys so as to conform with the requirements of the Clean Air Act, 1956.

Reference was made earlier to the importance of production of electricity as a major factor in the attainment of our national clean air aims. Another important factor, and particularly in the domestic field, is town's gas. Major increase in such gas production is clearly necessary and it is comforting to appreciate that as a result of the recent technical breakthroughs concerning the reforming of hydrocarbons this increased production will not be accompanied by deterioration of conditions at gas-works. The new techniques are smokeless and should carry in their wake the disappearance of that music hall and seaside concert party jest, the local gas works smell.

SPECIAL INDUSTRIAL SMOKES

The most tractable, or perhaps more accurately, the least intractable of industrial dark smoke problems was, of course, that of steam raising. Certain other smoke emissions presented major difficulties, but most have either been solved or are on the way to being solved. Possibly the only serious remaining unsolved problems concern the production of blue engineering bricks and production of lime in coal-fired shaft kilns. Although the emissions from these are serious and in some cases have to be seen to be

believed, the operations are largely localized and the total coal involved is only the equivalent of a 300 MW power station. Progress in dealing successfully with some special emissions is given below. A notable omission is that of smoke from various heating and re-heating processes in the iron and steel industry. At the time of the Newton Report (1921) it was firmly believed that for the production of many grades a smoky atmosphere was essential. How this was dealt with is one of the success stories of the past quarter of a century, but it is felt that this would more fittingly be dealt with by representatives from one of the great steel towns as a separate paper on some future occasion.

Pottery

At one time the whole of our pottery came from the traditional, coal-fired, bottle oven once such a striking feature of the Potteries landscape, and which, not even by strict adherence to a code of practice (which adherence it seldom received) could be fired without black smoke. These bottle ovens have been steadily eliminated by kilns using smokeless methods of firing. Before the 1939-1945 war there were over 2,000 coal-fired, operable bottle kilns in the Stoke-on-Trent area. By 1958 there were about 300, and by 1961 about 100. The total is now around 20. There is similar progress to report elsewhere in the other and smaller centres of production. Thus the dozen or so bottle kilns in the Poole area have ceased to operate. Almost all the one-time smoke from the manufacture of pottery has thus disappeared.

In view of the enormous improvement which has occurred it is salutary to refer to Dr. Ballard writing in 1878. "Effluvium nuisance occasioned by ordinary pottery making arises from the smoke evolved from the chimneys. These are almost invariably low, being in fact the top openings of the hovels in which the ovens are placed. In the pottery district of

North Staffordshire such chimneys may at any time be seen vomiting forth black smoke, which not being much heated and not passing away with any remarkable velocity, does not rise high into the air, but quickly falls, filling the streets and roads to such an extent as sometimes to impede vision beyond a distance of a few yards. . . . It is impossible to say to what extent this smoke which pervades the pottery towns, more or less at all times, and especially in some conditions of the weather, affects public health. Certainly it is not conducive to mental exhilaration, and inasmuch as it fouls the skin and clothing, and sometimes compels householders to close the windows of their houses to keep it out, must be on those accounts alone unfavourable to public health, especially among children and among classes of persons who are not much given to ablution. Such a smoky atmosphere as prevails habitually in some of the pottery towns, may not demonstrably shorten life, and diseases may not be distinctly traceable to its operations, yet it is impossible to doubt that it is injurious in at any rate an indirect manner by favouring the operation of other more obvious causes of disease."

Salt

Salt has for centuries been and indeed still is produced by the evaporation of brines. A century ago and for many years thereafter it was entirely produced in open pans heated by hand-operated coal-fired furnaces and as the Report of the Royal Commission of 1878 states: "during the process black smoke escapes in dense volumes". This was confirmed by Dr. Ballard who wrote that the smoke "proceeds in dense black volumes from the low chimneys obscuring light and vision . . . so that it is impossible to see any distance beyond the works". At that time and with a national production of about two million tons yearly there were over 1,000 such pans in the Winsford-Northwich area of Cheshire alone. There are now but 60 open pans

operating in the whole of England and Wales and with but two, which make a special grade of salt, hand-fired. The remainder are mechanically fired and with smoke emission down to the minimum. Current yearly make of salt by the open pan route is 100,000 to 150,000 tons, with about one million tons by the virtually smokeless vacuum evaporation route and with over four million tons used directly as purified brine in the heavy chemical industry without actual separation of salt. My predecessor wrote in 1881: "one of the evil things sent out from salt works is black coal smoke . . . many attempts have been made to slay the monster but without success". There is thus now one monster the less.

Coke Ovens

Some 23 to 26 million tons of coal are carbonized yearly in coke ovens in England and Wales. Coke ovens, their mode of operation, their emissions and the report of the working party of the industry and the alkali inspectorate on the treatment of these emissions were discussed at moderate length in the 1960 Alkali Report and it is freely admitted that coke ovens present a formidable problem if emissions are to be reduced to the amounts now felt to be necessary by local public opinion. The crux of the matter is the intermittent nature of the operations. Could a continuous process be devised ninety per cent of the present difficulties would disappear. As it is there is a long and uphill task before us. Yet we are now at a stage which at one time would have been considered as a more than satisfactory solution and it will not be amiss to look back and realize just how bad things once were. The Royal Commission of 1878 were particularly appalled by the seriousness and extent of the emissions from the then universal beehive ovens. It was admitted in evidence by the producers that one-third by weight of the coal used was lost in the form of a thick, black, tarry smoke discharged at a height of from 10 to 15 ft. Mr.

Lowthian Bell, M.P., himself a major producer, admitted that "The effect of the vapours emitted by coke ovens on vegetation is terrible". Dr. Ballard is in his best form on this facet. "Coking is a very great nuisance on account of the constant issue of large volumes of black smoke. Issuing at low level, the fume sweeps along with a wind close to the surface of the earth and produces a sooty and acidic condition of the atmosphere. . . which is distressing and suffocating to strangers, and the unwholesomeness of which, to persons habitually exposed to it, it would be an insult to common sense to question. . . in addition, an habitual disregard of wholesome ablution is sure to grow up out of the despair generated by unsuccessful attempts to maintain even an approach to personal or domestic cleanliness under such circumstances."

The Royal Commission recommended that coke ovens be brought under the Alkali Act, but this was one of the few of their recommendations which was not accepted. Coke ovens eventually came under the Act in 1958. Progress towards current standards really began when the first by-product coke ovens were built at Crook, Co. Durham, in 1882. The last beehive battery, at Whinfield, Co. Durham, ceased operating in 1958.

CHEMICAL AND ALLIED INDUSTRIES

Although the first Alkali Act dates from 1863 and its centenary was properly, and, I believe deservedly, celebrated last year, a more important year, in that it was one when crucial and far-reaching decisions were made, was 1878. The Alkali Act of 1863 concerned only the first (saltcake) stage of the classical Leblanc process for the production of alkali. It was somewhat extended by the Act of 1874 giving powers of control over a few "noxious or offensive gases" from alkali works. The national position was, however, again most unsatisfactory. Since the passing of the first Act production of alkali had increased

fourfold and there had been a similar increase in those industries also sending out destructive or offensive emissions not subject to inspection. Complaint of damage was once again widespread and justified. The Royal Commission on Noxious Vapours was therefore set up in 1876 under the chairmanship of Lord Aberdare "to inquire into the working and management of works and manufactories from which sulphurous acid, sulphuretted hydrogen, and ammoniacal or other vapours are given off, to ascertain the effect produced thereby on animal and vegetable life, and to report on the means to be adopted for the prevention of injury thereto arising from the exhalations of such acids, vapours and gases". The Commission, which reported in 1878, went about its task with Victorian thoroughness, visiting Widnes, Runcorn, St. Helens, Northwich, Tyneside, Swansea and "the banks of the Thames below the metropolis". They inspected alkali, cement, chemical manure, coke, copper, glass, lead, nickel, pottery and salt works. They received evidence in London, Liverpool, Tynemouth, Newcastle-upon-Tyne and Swansea from manufacturers, landowners, farmers, clergymen, occupiers of lands and gardens, land agents, scientific witnesses, medical men and local officers and from the alkali inspectors. The record of evidence and the Report reveal a devastation and damage in the vicinity of chemical and metallurgical works, a general industrial smoke pall and an assortment of miscellaneous stench which are almost impossible of comprehension and certainly of acceptance to-day.

As to the contribution of acid gases from the chemical industry to the devastation, the Royal Commission confirmed that damage to vegetation, crops and cattle in the vicinity of the works and in some cases at a considerable distance, had occurred in the past and in varying degrees was still occurring. Their comments, always forthright, were particularly so on the state of some of the works visited

where "... the walls were cracked, the towers out of perpendicular, the joints of pipes leaked, the furnace walls emitted gases and the general appearance of the works betokened an insufficiency of means to carry on the works efficiently." There had been some dispute as to whether the alkali inspectors had power to deal with such deficiencies. The Commission recommended that this doubt be removed and control over such matters has since been an integral part of the responsibilities of the alkali inspectorate.

The Commission also confirmed that much public irritation and some of the evil effects complained of were due to sulphuretted hydrogen from alkali waste heaps and which was "capable of being conveyed by a gentle wind fully eight or nine miles." Alkali waste also known as tank waste, a mixture of essentially calcium carbonate and calcium sulphide, was an unavoidable side product of the Leblanc alkali process. For each ton of soda made there was need to dump nearly two tons of this waste and soon vast heaps accumulated. In Widnes the evil-smelling mud was known as "galligu" an onomatopoeic term to indicate its slushy consistency and general nauseous nature. Under the action of rain offensive liquors seeped from the mounds into streams flowing alongside and the discharge of waste acid into these streams gave rise to serious and at times dangerous liberation of sulphuretted hydrogen. Until there was a demand for chlorine, usually for the production of bleaching powder, most of the hydrochloric acid compulsorily scrubbed out of the waste gases at alkali works was unwanted and was discharged into these same local brooks and streams. Hence the seriousness of the matter.

As an illustration of conditions that are now happily gone for ever Dr. Ballard is again quoted. "What occasions the greatest nuisance is the admixture of waste acid from the works with the tank waste liquor in pools, ponds or brooks. Under ordinary atmospheric influences the

decomposition of the liquor is slow and gradual, and the evolution of sulphuretted hydrogen correspondingly gentle. But the mixture of acid directly with the liquor causes an abundant and rapid evolution of this gas sufficient to create one of the most intolerable of nuisances. One of the best illustrations of this last source of nuisance that I met with was at Church, a little village on a tidal stream called the Don, which receives abundance of liquor in its course, but the banks of which are formed of waste which is washed and thus made to present a newly exposed surface at each tide. Large quantities of hydrochloric acid are discharged below the village, and when the tide rises it brings up this acid with it. I never had the misfortune of such an exposure to sulphuretted hydrogen as on crossing the bridge over the river close to St. Bede's Church; it was sickening, and the nuisance strongly pervades the little village".

The Commission recommended that control over the disposal of such waste should be entrusted to the alkali inspectorate.

On the matter of "copper smoke" the Royal Commission came to the same conclusion as the Lords Committee of 1862, that the injurious effects were at least as great as those of the acid gases from the alkali works. This was particularly true on Tyneside and St. Helens, where the greater part of the damage was attributed to copper smoke, whilst "the bare and blasted aspect of the country round the copper works of Swansea leaves no doubt as to its destructive effects". As with the Lords Committee they could see no means for dealing with the nuisance, but they recommended copper works be put under the Alkali Act so that they could regularly be visited by inspectors in the hope of an eventual solution being found.

The Royal Commission was forthright on the nuisance caused by chemical manure processes, tar distilleries, by-product ammonia works,

on various facets of dark smoke production and on cement making and recommended that these also be entrusted to the care of the alkali inspectorate.

On the health aspect the Commissioners were much less forthright and came to no definite conclusion stating "the evidence given as to the alleged high death rate in certain parts of Liverpool and in towns on the bank of the Tyne, is encountered in the case of Widnes and Swansea by equally specific evidence as to the low death rates and generally healthy character of the population of these towns". They felt, however, that they could not disregard the opinion expressed by all the medical witnesses that some injurious consequences were due to these gases and that public health would be benefited by their diminution.

The general tendency of evidence heard was that all these works should be subject to regular inspection either by the central or the local authority. On the whole industry, which was somewhat frightened and rather bewildered by the damage it was causing, was in agreement, but favoured powers being placed in the hands of the central authority. Interestingly enough the only witnesses who, advocating the principle of inspection, were on the whole in favour of local as opposed to central inspection were civil servants, being the witnesses from the Local Government Board, the forerunner of the present Ministry of Housing and Local Government, and under whose aegis the alkali inspectorate were then, as now, operating. After reviewing all the evidence the Royal Commission recommended that the task be entrusted to the central authority and that the Alkali Act be extended and amended according to certain recommendations. Most of these were accepted but the administrative and political climate was such that the recommendations on copper smoke and on the black smoke processes were not acceptable. Copper smoke had to wait until 1906 for registration

under the heading of smelting works and the others to 1958 before inclusion in the Alkali Act.

The eventual result of the Royal Commission was the Alkali etc. Works Regulation Act, 1881, the first of the Alkali Acts attempting comprehensively to deal with a growing chemical industry. The Act of 1881 was the beginning of a period of achievement, possible in no other country, in that there could be a truly national policy in these matters. The central authority and the alkali inspectorate were fortunate in that the first chief inspector, Dr. R. Angus Smith, was still in post to ensure that the new venture was started with the proper mixture of understanding, occasional forbearance and necessary firmness when called for.

It would be tedious to go into details as to how these various problems were dealt with. For such as are interested, the practice was begun in 1960 of selecting some of the older registered processes for historical and technical review in the published alkali reports. They are as follows, the year of the report being given: alkali (1963); alkali waste (1960); cement (1960); chemical manure (1961); chlorine (1961); nitric acid (1963); salt (1962); smelting (1962); sulphate of ammonia (1961); zinc (1962). For purposes of record, mainly to keep pace with an expanding chemical industry there were further Acts in 1892 and 1906, the scope of the latter being extended by Orders in 1928, 1935, 1939, 1950, 1958, 1961 and 1963.

The Orders of 1928 to 1950 inclusive were merely expansions of the scope of the Act and along conventional lines. The 1958 Order was that which greatly expanded the scope so as to cover the "smoke" processes as recommended initially by the Committee on Air Pollution (Cmd. 9322) under the chairmanship of Sir Hugh Beaver and concerning which I had the privilege of addressing this Conference in 1962. The 1961 Order was a highly specialized one dealing with toxic metals. The 1963 Order was in the main a return to the conventional

chemical engineering field of the alkali inspectorate. It also effected the first "descheduling" whereby control over emissions from certain processes was returned to the care of local authorities. Such return was also one of the recommendations of the Beaver Committee.

Over the years the alkali inspectorate and the industries in their charge have had their set-backs and their failures, yet they have achieved much. Often we have learned our lessons the hard way and have our scars. Yet we have learned not to make the same mistakes twice. Perhaps the greatest and indeed crucial achievement was in the immediate post-war years when we had to face up to the new and urgent problems presented by the massive post-war expansion of the heavy chemical and allied industries, and of the developing petroleum industry. Lessons already learned the hard way, but relating to a much smaller scale of operation undoubtedly came in useful, but the late 1940's and early 1950's called for rapid re-orientation of thinking and urgent reappraisal of standards. There were inevitably mistakes of detail, but the broad decisions were sound. The farmlands come up to the boundary fence. There are occasional complaints, often justified, but neither litigation nor bitterness, nor need for a Royal Commission.

It was the success attained here that gave confidence to cope with the 1958 Order processes, power generation, coal carbonization, iron and steel, brickworks and the like. The tasks were often greater as regards scale of operations, but we had had our gruelling experience a few years earlier and when we had to jettison some of our cherished pre-war concepts. The 1958 Order processes brought with them the need for an equally important re-orientation of thinking and of re-appraisal of values in the field of public relations. Before 1958 the alkali inspectorate were perhaps inevitably a somewhat esoteric body, but with the acceptance of clean air legislation on a national scale they are now permanently out of any

ivory tower. One of the most pleasing features is the increasing and cordial liaison between the alkali inspectorate and the officers of local authorities. It is an instruction to inspectors that routine calls on local authorities to review matters of mutual concern are an integral part of their duties. I am also pleased to record that inspectors are increasingly invited to give talks to local authority and industrial groups and to scientific and technical bodies on problems of industrial emissions and their solutions. When I spoke to this Conference in 1962 it was the first time a chief alkali inspector had done so. That was one barrier flattened and I trust that talk will be the forerunner of many.

It is not proposed here to discuss our present problems. This is essentially a historical review. Our current problems are considered in each successive alkali report, and in any case my successor will be available at future Conferences to deal with such matters if need be—as I hope it will.

Before concluding, a brief reference to my one ewe lamb, the published annual reports of the chief alkali inspector. It is a statutory requirement that he "on or before the first day of March in every year make a report in writing. . . of the proceedings of himself and of the other inspectors . . . and a copy of such report shall be laid before both Houses of Parliament". Some of my predecessors may have regarded this as a tedious task, but the first two chief inspectors clearly relished it and I have certainly done so. My major regret is that modern restrictions as to space prevent me from moralizing at the lengths permitted in the Victorian age. I have tried in these published reports to give in as straightforward and as homely a fashion as the technicalities allow an account of the state of each industry as concerns its size, its problems, how they are being tackled and of our successes and of our failures, neither stressing the one nor concealing the other. It is of prime importance that there should be an honest and a continuing record.

They contain as fair and as honest and as understandable an account of each year's activities as I can make them to be. I attach real importance to the various recorded averages of tests made on final escapes to air and have steadily increased the list since I became chief inspector. The recorded figures are actual performances, not mere standards agreed by a committee of savants in the pious hope that sometime industry will adhere to them and somebody will go round to check that it does.

This paper is given in no mood of complacency. No one can be better informed than the chief alkali inspector of the remaining pockets of technical difficulty, of the few—the very few—firms who are less co-operative than they might be, of the new tasks facing us or of the still dimly seen problems of the future. Yet by no system of assessment, however strict the scrutiny, can the progress be regarded as other than massive. As a national achievement it stands second to none.

DAMAGE TO STOCKINGS

Request from Czechoslovakia

*The Editor,
Smokeless Air,
Sir:*

I am in charge of a recently built laboratory concerned with the influence of air pollutants on high polymers. My apparatus simulates air pollution conditions and makes pre-mixed air containing various pollutants come in contact with samples of materials which are continually stressed and unstressed, during the experiment. Special attention is given to synthetic fibres on account of their high surface/weight ratio and because some of them are noticeably deteriorated by various gas-state, liquid and solid pollutants usually encountered in urban and industrial atmospheres (e.g. SO_2 , NO_2 , O_3 , H_2SO_4 and tar droplets, dust and soot particles with adsorbed corrosive gases, etc.).

I am carrying out an extensive investigation concerning the actually observed effects of air pollution on apparel. What I am especially interested in is the rapid disintegration of ladies' nylon stockings which respond by multiple laddering to the minute local destructions or tendering of the fibres.

It would help me very much if your

members and readers who have witnessed, heard or read of ladies' nylon stockings being suddenly damaged or even destroyed beyond use could get in touch with me and, possibly, give me further details, such as site and date of occurrence, number of stockings involved, meteorological conditions prevailing at the time of damage (such as air temperature and humidity, visibility, i.e., fog, drizzle, rain, snow, wind, etc.), as well as other particulars, especially whether there was a power plant, a chemical works, a fertilizer plant, a steel mill, or similar industry, in the neighbourhood. Besides, I am very interested in damage done to stockings during and owing to road, rail and sea travel. I shall be very grateful for all information concerning the deterioration of textiles and plastics owing to air pollution but I think that damage done to ladies' stockings is the most noticeable one.

Information of this kind will help me very much in assessing the impact of air pollution on textiles and plastics as well as in programming my simulation apparatus.

I thank you very much for your kindness and I am, Sir,

Yours faithfully,

ZDENĚK TRÁVNÍČEK,

Smog Degradation Research Laboratory,
Koněvova 2044,
Varnsdorf IV., okr. Děčín,
Czechoslovakia.

Information For Architects

Fairly or not, architects have been criticized for the comparative lack of interest in the heating methods used in the buildings they design, and in particular those concerned with clean air have regretted the lack of understanding and support they have felt should be forthcoming from the profession generally. After all, one of the most serious consequences of air pollution is the damage it does, both physical and aesthetic, to buildings old and new.

Recognizing this problem, the National Coal Board has launched an important new service called "Information for Architects", or I.F.A. for short. To quote from the explanatory leaflet that has been issued:

"The foundation of a really efficient and economical heating installation begins in the earliest outline planning of a building. It demands that the architect be in possession of certain essential planning and cost data for the kinds of installation, their requirements, possibilities and limitations. In assembling this information, it became clear to the Board that a simple and objective introduction to the whole subject of heating would emerge".

It was felt that such information would not only be of value to architects, but would provide an invaluable aid in teaching students of architecture, building, heat and ventilation. The Board therefore sought the support and assistance of a committee of architects and teachers of architecture, and as a result a series of ten separated and self-contained booklets, each dealing with an aspect of design and equipment, are being issued. Based on the proposals of the committee, the booklets are being prepared for the Board by the College of Fuel Technology, in consultation with the Technical Information Service of the Royal Institute of British Architects and Brunton, Baden Hellard and Boobyer, Chartered Architects.

The booklets of foolscap format, are handsomely and clearly printed, with the material sectionalized to permit quick reference and ready assimilation. They are practical and to the point, and deal in the main with principles and giving a broad understanding of the questions that are involved.

The first four of the booklets to be published deal with (1) Solid fuels; (2) Storage of solid fuel and ash; (3) Mechanical handling of solid fuel and ash; and (4) Automatic firing methods.

Then to follow (some of which may be available by the time this review is published) are: (5) Solid fuel boilers; (6) Chimneys; (7) Radiators and heat exchange equipment; (8) Heat distribution system; (9) Assessment of heat requirements; and finally, (10) Planning for heating.

The booklets are offered free of charge for distribution to senior students, and for information about their availability to others who may be interested inquiry should be made to the Marketing Department of the National Coal Board, Hobart House, Grosvenor Place, London, S.W.1.

Needless to say, this journal will be particularly interested in No. 6 Chimneys, and we understand that it will discuss the question of chimney heights. This will be fully reviewed as soon as it is available.

PUBLIC HEALTH ASPECTS OF REDEVELOPMENT

The above was the title of a paper read to the Public Works and Municipal Services Congress in November last by Mr. E. M. Birtwistle, Chief Public Health Inspector, Horsforth U.D.C. (and Chairman of the N.S.C.A. Parliamentary and Local Government Committee.)

Under the heading "Rehabilitation" Mr. Birtwistle said:

"No longer should we be satisfied with merely providing Victorian terrace houses with bath and regarding our improvement as completed. Of recent years Parliament has given us other tools to use in raising the standards of an area. No public health inspector should be considering designating improvement areas which are not also to be smoke control areas; where industrial nuisance will be tightly controlled, where unnecessary noise will be eliminated, where refuse collection systems will be of the best and where open spaces will be sown with grass and planted with trees.

"Even more could be achieved if traffic were to be routed so as to avoid improved areas, carless zones created, pedestrian access only provided in many streets, and energetic steps taken to make such an area one which estate agents could truthfully describe as 'a desirable residential area'."

Later, under the heading "New Buildings" the author went on to say: "Clean air is an obvious necessity in all new development. Heating and cooking will always be by smokeless apparatus but much more a change to smokeless fuel is involved. A very wide range of heating arrangements is now available but most regrettably many people, including architects and builders, are not sufficiently adventurous to take advantage of all the research which is being undertaken. Many still hanker after the high temperature single point heat sources which typify the open fire, rather than take advantage of low temperature sources which heat rooms and people much more efficiently and give a pleasant and even distribution of heat.

"So attached are we to the high temperature single point heat sources that as a nation we insist on the newer fuels, electricity, gas and oil, and indeed newer solid fuels, being used in appliances which imitate the open coal fire. Every opportunity should be taken to break this tradition and give to the fuel industries the opportunity

of using their resources in more effective ways. Electrical storage heating, particularly underfloor types, gives electricity a convenient and economical way of assisting. The roomheater is a most effective appliance for the burning of a whole range of solid smokeless fuels. Hot air, hot water and other forms of central heating generally open up new applications for all fuels and we could look forward to many other developments if the industries are given sufficient encouragement to make research worthwhile."

Solid Smokeless Fuels

Federation's Conference at Bolton

The Solid Smokeless Fuels Federation has embarked on an excellent series of conferences for local authorities in the "black areas", for the purpose of explaining, demonstrating, and answering questions about the solid smokeless fuel supply situation and the new arrangements for appliance conversion. Wisely, these conferences are being held on a district scale, where problems are likely to be similar and the numbers attending will not be too large, rather than regionally. The first three to be held, for example, have been in Manchester, Liverpool and Bolton, in each case for the authorities grouped around these towns.

The conferences have followed a similar pattern, and the last, at Bolton on December 12 was arranged as follows. With Mr. Hodgkinson, Chairman of the North Western Gas Board in the Chair, the meeting opened at 10 a.m. with a short introductory address by a representative of the N.S.C.A. At the first two meetings this was done by the President, Dr. Parker, and at Bolton by the Director, Mr. Marsh. Then followed addresses on appliances and conversions, their costs and grants, by

Mr. Giblin and Mr. Newman of the S.S.F.F., followed by questions. Slides were shown and figures were screened showing the cost of conversion for the different classes of installation. This was followed by questions and answers. This was all on a helpful, practical level, and was followed by an opportunity to see an exhibition of appliances in which various fuels were burning.

Then came lunch, by invitation of the Federation, for all the delegates, with the Deputy Mayor of Bolton as the chief guest. In the afternoon the Mayor himself was present and spoke to the meeting before a panel of speakers, representing all the fuel producers and the distributors, took over to answer the many questions that were fired at them—some quite forcefully.

Of the 24 authorities in the district all but three were represented. Invitations had been sent to the chairmen of health, housing and finance committees, the Clerk, M.O.H. and C.P.H.I., and perhaps others concerned. In some cases six or seven representatives from one authority attended. The total attendance was about 90.

The Federation is to be congratulated on its enterprise in organizing these meetings which, one feels, are serving a valuable two-way purpose. First, they are giving local authority representatives an excellent opportunity to inspect appliances and obtain first-hand information about them and about the fuels, and about problems of conversion and grant. On the other hand the fuel producers and suppliers can benefit from hearing at first-hand about any difficulties and doubts that may exist among the authorities. It must be agreed that difficulties and misunderstandings do arise on fuel supplies, quality and prices, and to resolve these it is important that communications should be good. Conferences such as these promote such communication and mutual understanding and for that reason alone are to be valued. It is encouraging that the Federation should

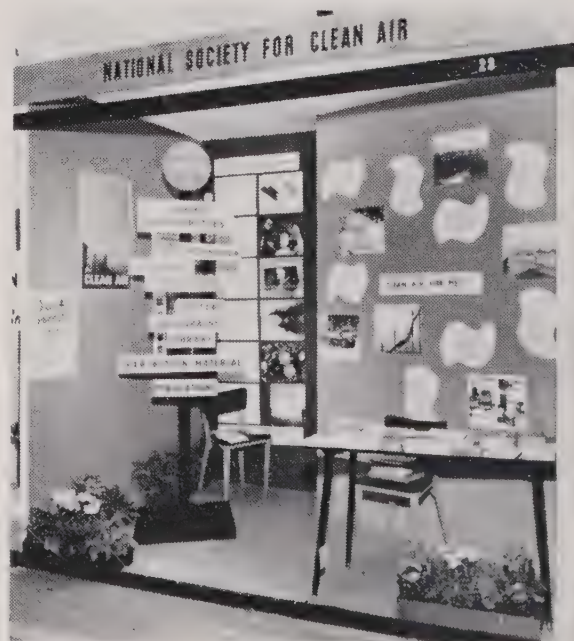
have a programme of such meetings, and encouraging also that so many local authorities should be responding by their participation.

Publications received as we went to press, and which it is hoped to review in our next issue, include the *Fluorosis in Cattle* report of the Ministry of Agriculture, Fisheries and Food (H.M.S.O., 10s.), and the *Seventh Annual Report of the Warwickshire Clean Air Council*.

A.P.H.I. Portsmouth Conference

A paper on "Smoke Control and Domestic Heating" was given by G. O. Allen, Esq., C.P.H.I. for Scunthorpe on Wednesday, September 16. Members of the Society made important contributions to the ensuing discussion. The conference has been fully reported in *The Sanitarian*, the journal of the Association of Public Health Inspectors.

The Society had a stand at the accompanying exhibition. It concentrated on emphasizing the services extended to local authorities in their efforts to implement the Clean Air Act. A constant flow of inquirers, many from overseas, enabled this role to be fulfilled and quantities of literature were distributed.



Our stand at Portsmouth

"It Takes your Breath Away"

A group of students attending a course at the Ciné Department of the Polytechnic School of Photography, London, were discussing ideas for a new film at a script conference early in 1964. The idea of dealing with smoke abatement emerged and contact was made with the National Society for Clean Air. As a result the whole group were invited to discuss the project with the Society's Assistant Secretary and Information Officer.

At this initial meeting it was decided to expand the idea to include air pollution generally and to seek the co-operation of Dr. Mary Catterall whose paper to the 1963 Scarborough Conference had made a profound impression on the students. This co-operation was readily forthcoming and despite the problem of working on location in the Leeds area shooting commenced in the Infirmary and city streets within a few weeks of the initial meeting.

As the students were attending the course for one day each week it was necessary for them to spend three days visiting the various locations and travelling between Leeds and London. This they did with enthusiasm and entirely at their own expense. Not

surprisingly the students found a spirit of ready co-operation awaiting them, patients of the Infirmary with chronic chest conditions doing so in the belief that their efforts might serve to prevent others contracting the same ailment.

Other shots for the film were taken in the studio and on various locations around London during the normal once weekly attendance at the Ciné Department Course.

The commentary for the film was written by Dr. Mary Catterall and spoken by B.B.C. Commentator, Bryan Martin.

Delegates to the Harrogate Conference were able to see the World premiere of this film* and it is hoped that the production will be made widely known. The Director, Kenneth W. Fensom, is to be commended for making possible what must surely be a unique film, one that reflects the enthusiasm and eagerness of the amateur and yet contrives to present an impression of mature and sober contemplation of the subject.

The film will appeal to public health authorities and be of great value in those areas where ignorance and complacency are hindering the implementation of the Clean Air Act.

*"It takes your Breath Away". 16 mm. black and white. 10½ minutes.

Rehearsing a scene in the film to show the soot on a slide in a recreation ground—transferred, as subsequently shown, to the seat of the child's white slacks



News from the Divisions

SOUTH-EAST

The 10th Annual General Meeting of the Division of the Society was held on November 5th in the Library of the Royal Society of Health, London. After receiving the annual report, the following results of the elections were announced: Chairman, Mr. W. Combey; Deputy Chairman, Ald. C. H. Smith; Honorary Secretary: Mr. J. S. Hodgins; Minute Secretary: Mr. G. C. Stubbs; Hon. Auditors, Messrs. G. H. Cockell and G. C. Smith.

Attention of the meeting was drawn to the problem of nuisances arising from the burning of timber on demolition sites in Central London and to the need for control by a responsible body. After a short discussion which included references to smoke control under the forthcoming new Greater London Council, the formal business was completed and the Chairman introduced Mr. P. D. Coates of the Ministry of Housing and Local Government who addressed the meeting on "The problems and difficulties arising from Circular 69/63 and the White Paper on Smoke Control".

His intention, said Mr. Coates, was not to give a "pep-talk" on smoke control, but to indicate the effect of the Circular from his Ministry's point of view and to find out from his audience how the new arrangements were working out in practice. He realized that the period of re-adjustment to these, would result in a loss of momentum in smoke control, but this was encouragingly small in the South East. There had been some teething troubles with the Circular; for instance some local authorities thought they did not have to give a freedom of choice in heating appliances

to the householder and some Gas Boards did not at first give clear-cut answers about supplies of coke.

Dealing with the principal snags and difficulties, none of which were insurmountable, Mr. Coates said that as far as the important question of increased costs was concerned, it was not yet known how much the new arrangements would cost, but the increase seemed to be less startling than originally supposed. Regarding new representations to the Minister that conversion grant proportions should be increased, it would be unwise for any local authority to assume, said Mr. Coates, that the Exchequer contributions would become greater.

As a result of the new situation, the administrative work of the Ministry had become extremely complex said Mr. Coates, and he was considering ways to simplify procedures on individual smoke control orders. One of such ways might be the issuing of a list of maximum prices for various approved appliances, from which local authorities could choose, but there was danger here that the maximum would become the minimum. It was much more difficult to impose a maximum limit on installation costs and that problem seemed intractable to the Ministry at present.

The Ministry was also intending to revise the "Question and Answer" material on smoke control and Mr. Coates wished to know whether local authorities would prefer to receive the information in a circular which could be adapted for each authority's publicity requirements or whether the Ministry should do the whole job and produce uniform leaflets.

Mr. Coates said that while the Circular gave a freedom of choice to

the individual householder, there was no guidance in it about local authority housing where the load should also be spread among various fuels. An oversight of the Circular was that privately owned tenanted property was not mentioned and Mr. Coates wondered if that had been found a difficult problem to solve. There were suggestions that the Ministry should issue practice notes and he wished to know what people had in mind in this respect.

In the useful discussion that followed Mr. Coates' address, many of the public health inspectors present mentioned their particular difficulties in implementing the new regulations and gave their views on the points about which Mr. Coates wished to be informed.

WEST MIDLANDS

At the kind invitation of the Chairman of Messrs. Lunt, Comley and Pitt Ltd., the autumn sessional meeting of the Division was held at the Pensnett Trading Estate on Tuesday, November 10 at 2 p.m.

The trading estate is on the outskirts of Dudley and was, for over 100 years, the site of coal mining activities. Lunt, Comley and Pitt installed a fully mechanized solid fuel handling plant at Pensnett and, following the closure of a number of stations to coal traffic, a Concentration Scheme was established in May to cope with the problems of the supply and delivery of fuel to the depot. The West Midlands Gas Board have undertaken to supply trainloads of Gloco and coke from their Birmingham works and the National Coal Board has arranged to supply the Depot with two trainloads of house coal from the Cannock area every week.

A party of members (limited to 40) were welcomed by the Chairman of Messrs. Lunt, Comley and Pitt Ltd., Mr. R. D. Pitt and an address on the Fuel Handling Plant was given by Mr. R. F. E. Catherwood the Group Development Officer. Members then

toured the plant and were particularly impressed by the movement of British Railways hopper wagons by electric haulage gear. Degradation of fuel is reduced to a minimum as it is transferred to the hoppers and then discharged through vibrating feeders to a common 42 inch conveyor belt which distributes the fuel to road vehicles.

Tea, which was supplied by the Company, provided an opportunity for members to ply the Chairman and Mr. Catherwood with questions.

EAST MIDLANDS

The Division met at Corby on September 3 at the joint invitation of the Urban District Council and Messrs. Stewarts and Lloyds Ltd. Fifty-eight members and representatives were present with Councillor Mrs. D. M. Ashley, the Divisional Chairman, presiding.

The morning was devoted to an extensive tour of Stewart and Lloyds Iron and Steel Tube works where, since the 1920's, iron ore from the surrounding countryside has been used. Atmospheric pollution, mainly the typical orange cloud from the Bessemer plant, is considerable but the installation of L.D. plant in 18 months time should result in complete fume collection. Water scrubbers and electrostatic precipitators will be used to achieve fume control.

Lunch was provided by the Company under the Chairmanship of Mr. W. N. Menzies Wilson, Managing Director of the Iron and Steel Division of Stewart and Lloyds. In an informal address to members, Mr. Menzies Wilson dealt with the measures undertaken by the Company in the field of atmospheric pollution control; £2,000,000 had been spent in the last 10 years.

After lunch a coach tour of the New Town was organized by the Corby U.D.C. This culminated at the Community Centre where a welcome was given by Councillor Mrs. Marshall, U.D.C. Chairman, followed by an

address on "Clean Air in a New Town" by Dr. F. R. N. Lynch, M.O.H., Corby U.D.C. He dealt with industrial pollution in the New Town and the anticipated improvement that would result from the closing down of the Bessemer Plant and the changeover to diesel locomotives in the Works.

Dr. Lynch then described the setting up of Corby's No. 1 Smoke Control Area in which 3,528 dwellings and ancillary buildings were situated. Good publicity had accompanied the establishment of the area in 1961 and continued since then. As a result only 14 verbal warnings had been given to the 12,000 inhabitants in the area. A further smoke control area to embrace a population of 11,000 is being surveyed and will be speeded up when the Council is sure there will be enough solid smokeless fuel to fill all requirements.

Tea was provided by the Council at the end of the meeting.

NORTH WEST

The North West Division followed up the Harrogate discussion on the smoke control area situation by holding a meeting in Liverpool on October 27 with Professor A. Semple, M.O.H. for Liverpool (and later in the meeting with Mr. W. Wattleworth, C.P.H.I.) in the Chair. Mr. J. Kay, of Stretford, introduced and discussed the report on the North West he had presented at the Harrogate Conference (Mr. Kay's report is of course included in the preprints of the conference papers and will be reprinted in the final Proceedings). He was followed by Mr. Arnold Marsh, the Society's Director, who summarized the reports from the other regions and compared them with the North West. He pointed out that the situation in the northern regions was very different from the south, where better progress in smoke control was being achieved. For the four northern regions the average consumption of house coal per head per year was 0.92 tons; whereas in the four southern regions it was 0.30, and in

the London area was as low as 0.17 tons. Clearly therefore smoke control was a much simpler problem in the south than in the north, where a bigger effort was needed. There was a useful discussion in which members raised a number of problems.

On December 1 the Division held a joint meeting (a welcome and long-standing custom) with the Institute of Fuel in Manchester. This took the form of a hot-pot supper at the Engineers' Club, followed by a discussion on the theme "I've got a Problem".

Working Party on Grit and Dust Emissions

A working party is being set up to advise the Minister of Housing and Local Government on grit and dust emissions from industrial and other similar furnaces.

The Clean Air Act, 1956, requires emission of grit and dust from furnaces to be minimised and new furnaces burning pulverised or solid fuel at a rate of one ton an hour or more to be fitted with grit and dust arrestment plant approved by the local authority and properly maintained. It is hoped that the advice tendered by the Working Party will facilitate administration of these provisions.

Mr. D. Hicks, director general of the British Coal Utilisation Research Association, has agreed to serve as chairman of the Working Party, the other members of which are: J. W. Batey, chief smoke inspector, City of Sheffield; S. C. Beaumont, chief smoke inspector, City of Birmingham; N. C. Cartwright, National Coal Board; W. J. Dickie, Federation of British Industries; F. E. Ireland, chief alkali inspector, Ministry of Housing and Local Government; F. C. Lant, Ministry of Power; B. C. Leavett, deputy chief services engineer, Courtaulds Group; Dr. L. E. Reed, Warren Spring Laboratory, Department of Scientific and Industrial Research; W. Short, National Industrial Fuel Efficiency Service.

The terms of reference of the Working Party will be: "To consider ways and means of measuring grit and dust emissions and to advise on the levels of emission admissible in relation to furnaces burning fuel equivalent to 100 to 50,000 lb. per hour of coal."

'Off-peak'

electric storage heating

is officially recommended

for future

Smoke Control Areas

(See Ministry of Housing and Local Government Circular No. 69/63)

Electric storage heaters meet all the requirements of the Clean Air Act.

Cheap to install. For existing premises, Unit-plan storage heaters are ideal—all that is needed for installation is a simple wiring job. For buildings still at drawing-board stage, electric floor warming is the cheapest system of all—it is incorporated as an integral part of the structure.

Cheap to run. Electricity is available at 'off-peak' rates. The cost per unit may be as little as *one-half* the normal rate.

Clean and convenient. 'Off-peak' electricity provides today's cleanest and most convenient form of heating. It complies *in every respect* with the requirements of the Clean Air Act.

Electric storage heating supports the Government's intention of encouraging vigorous action against pollution of the air in our cities and towns. It can make important contributions to this policy.

Free leaflet entitled "When your neighbourhood becomes a Smoke Control Area . . . here's how Electricity can help you"—written to advise and inform the public. Fill in and post this coupon now for one copy—bulk supplies obtainable through your Electricity Board.

To: Electrical Development
Association (P/NTD)
2 Savoy Hill, London W.C.2.



Please send me a free copy of "When your neighbourhood becomes a Smoke Control Area . . . here's how Electricity can help you".

NAME.....

ADDRESS

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AIR POLLUTION ABSTRACTS

*Abstracts of Papers Presented at N.S.C.A. Annual Conference,
Harrogate, 1964*

760. Presidential Address. Parker, A. (Proc. N.S.C.A. Conf. Harrogate, 1964). The paper reviews the White Paper and the accompanying circular from the Ministry of Housing and Local Government and concludes that the householder, although paying more, would obtain a more efficient heating unit at a bargain price of only 30 per cent of the real cost. Reviewing domestic fuel consumption over the past 30 years, it is stated that in spite of a considerable increase in the total amount of fuel and energy used in dwellings, pollution from domestic chimneys has been reduced by the beneficial effect of the changes in the relative proportions of the different fuels used. The domestic chimney is still responsible for more than three-quarters of the total amount of smoke discharged into the atmosphere. With an increase in the quantity of fuel burned, there has inevitably been an increase in the quantity of sulphur dioxide emissions, the amount of 6.25 million tons in 1963 being 50 per cent greater than in 1938. It is emphasized that in order to reduce smoke pollution it is essential that bituminous coal should be replaced by solid smokeless fuel, electricity, gas, oil and that all local authorities in densely populated districts establish smoke control areas as rapidly as practicable. After mentioning other pollutants discharged into the air, the paper stresses the importance of ensuring that the limits of air pollution are not again exceeded as they have been in some areas of Great Britain with serious results, particularly at times of fog.

761. Divisional Smoke Control Area Reports (Proc. N.S.C.A. Conf., Harrogate, 1964). Eight reports from the divisions of the National Society for Clean Air on the present situation of domestic smoke control in: Scotland, the North-West, the North-East, Yorkshire, West Midlands, East Midlands, the South-West and the South-East. All the reports deal with the reaction of the local authorities and of the public opinion to the publication in December 1963 of the White Paper on fuel supplies and clean air policy and the accompanying circular

from the Ministry of Housing and Local Government outlining the new arrangements for future grants in smoke control areas.

762. Air Pollution and Town Planning. Craxford, S. R. and Weatherley, M.-L. P. M. (Proc. N.S.C.A. Conf., Harrogate, 1964). The paper examines the distribution of severity of air pollution in towns and suggests how they might be planned within the limits of economic possibility so as to minimize pollution in the future. Figures are given for pollutants emitted annually in an average town of 100,000 inhabitants. While grit and dust fall is usually of a local nature, measurements of smoke and sulphur dioxide show marked differences according to the geographical position from which it is concluded that in building new towns or re-building old ones, particular attention has to be paid to the north of England and Inner London. It is further shown that (a) big towns can be as clean as small ones; (b) the drift of pollution from towns is so small as to be unimportant; (c) improvements in one part of a town are not nullified (though affected) by smoke drifting in from the surroundings. It is suggested that an industrial area of a town should be planned in form of a strip along the downwind side of the town and separated from it by a green belt. Sulphur dioxide effects could be further reduced by the use of high stacks. Great possibilities for the future lie in district heating systems. Modern redevelopment favouring wide roads with buildings of irregular heights should help to prevent exhaust gas trouble from road vehicles which can occur in "canyon" type streets. In cases of persistent temperature inversions the authors call for a provision of a "meteorological control".

763. Town Planning and Air Pollution. Page, J. K. (Proc. N.S.C.A. Conf., Harrogate, 1964). Owing to varied pollution sources in a modern city, co-operation in pollution control between adjacent authorities must be given highest priority. In town planning it is necessary

to separate problems of reducing existing sources of pollution from the problem of where to locate and how to control new sources of pollution and the paper considers practical planning techniques to meet these objectives. The degree of pollution in a city is largely dependent on the mean source density. The first weapon is to control the mass of pollutants emitted per unit ground area; the other basic technique is to control the time of emission. Once the pollution has been emitted, proper town planning measures are important for effective dispersal. A town must be considered as a three-dimensional aerodynamic system in order to find rational planning solutions. As the aerodynamic system is constantly subject to change, the effective height of a chimney is a relative and not an absolute concept. Nine planning considerations are listed as particularly important in vertical location of chimney terminals and seven planning conclusions drawn about the horizontal location of pollution sources. Regarding pollution from vehicles, little serious consideration has been given to these problems by most town planners and the Buchanan Report seriously underestimates the problem of dispersal of traffic fumes in high density urban areas. It is suggested that the best location for vehicles on pollution grounds, is raised well above the general environment, but this may conflict with other town planning requirements. As new pollution problems are continually supplanting the old ones, town planners will have to become more aware of the scientific issues involved in order to keep abreast of these new problems.

764. Smokeless Fuels: The Future Supply Position: Solid Smokeless Fuels. Wilkinson, F. (Proc. N.S.C.A. Conf., Harrogate, 1964). After emphasizing the interest of the National Coal Board in promoting clean air, the Board's developments and expansions plans are given, together with a progress report on plants which will be producing the new smokeless fuels for open fires and room-heaters, "Homefire" and "Roomheat". It is thought that the rate of progress of smoke control has been reduced as a result of the White Paper and the associated Ministry of Housing Circular of December, 1963. There is no justification for slowing down the introduction of smoke control orders on the grounds of inadequate fuels as from 1966 both the National Coal Board and the independent producers will be contributing considerably more than

estimated in the White Paper. Building practice, appliance development and prices are discussed. It is concluded that local authorities should be aware that the estimated shortfalls of solid fuel envisaged in the White Paper are no longer valid and that as far as can be seen, there should be no difficulties in meeting the requirements of an accelerated rate of smoke control.

765. Smokeless Fuels; The Future Supply Position: Oil. Rendall, E. (Proc. N.S.C.A. Conf., Harrogate, 1964). Oil differs from other fuels in that the supplying industry is international in character, and world oil shows a comfortable supply position well into the next century. The demand for oil has grown greatly in the United Kingdom in recent years and in less than 30 years, the country's refining capacity has increased by more than twenty-fold. Domestic fuel oil for the householder in smoke control areas has very low sulphur contents—below 0.8 per cent for domestic fuel, less than 0.2 per cent for light domestic fuel, and quite negligible for paraffin heaters. There are over eight million paraffin heaters in use at present and the demand is steadily growing for better heating standards in British homes with the consequent interest in flued appliances such as the domestic oil boiler and oil fired air heater. To assist the householder, planned delivery and planned payment for the fuel, is provided. A recent development likely to prove of interest to local authorities in the future is the method of central oil distribution, providing oil feed to houses or flats on an estate from a centrally disposed bulk oil storage.

766. Smokeless Fuels; The Future Supply Position: Gas. Jones, Sir Henry. (Proc. N.S.C.A. Conf., Harrogate, 1964). The paper estimates that of all the houses and flats built between 1972 and 1982, 85 per cent will have full central heating installations. Gas can fulfil the domestic demands for fuel with minimum pollution of the air and the sales of gas heating equipment are still rising strongly. New processes for gas making and the availability of natural gas may lead to coke production falling more rapidly than hitherto. At the moment stocks of gas coke exceed two million tons, 600,000 tons of which are of domestic open fire quality. Looking to the 1980's, it is anticipated that by then 100 per cent natural gas will be distributed instead of town gas. Reference is made to the natural gas from the Sahara and prospects

of much larger supplies from Dutch discoveries and surveys in the North Sea. Provided the householder gets a free and equal choice, the gas industry will look forward to continuing its major support of the spread of clean air.

767. Smokeless Fuels; The Future Supply Position: Electricity. Melling, C. T. (Proc. N.S.C.A. Conf., Harrogate, 1964). The spectacular increase in the domestic use of electricity during the last few years is described and a promise given that there would be no repetition of Christmas 1961 and 1962 circumstances, when overloading of generating stations caused the breakdown of supplies. Methods of using cheap off-peak supplies are discussed and it is suggested that an appropriate installation for a consumer would consist of a unit plan heating in the main living room and fixed electric fires in other rooms. The price of electricity over the years ahead should be relatively steady and the increasing demands for electricity will be met with an abundant and reliable supply at competitive prices, to the satisfaction of consumers in clean air zones and throughout the country.

768. A Century of Achievement. Carter, J. S. (Des Voeux Memorial Lecture, Proc. N.S.C.A. Conf., Harrogate, 1964). The paper describes the circumstances which led a hundred years ago to the passing in 1863 of the first Alkali Act which controlled acid emissions only. For years afterwards there was public acceptance of dark smoke as an unavoidable consequence of industrialization and excerpts are quoted from the reports of early Alkali Inspectors which illustrate the intolerable conditions during the 19th century in this country. The author describes the gradual progress in dealing with special smoke emissions from industry and reviews how the original Alkali Act was extended to include many other processes of expanding chemical and allied industries. In spite of the remaining pockets of technical difficulties at the present time, the progress in reducing air pollution in industry must be regarded as a massive and a national achievement.

769. Road Vehicle Pollution. Fawell, H. D. (Proc. N.S.C.A. Conf., Harrogate, 1964). Distinction is drawn between danger to health which comes from the invisible but toxic fumes from petrol-engined vehicles and danger to road users

from black smoke emitted by diesel-engined vehicles. After considering the differences in construction and operation of petrol and diesel engines, the paper gives the main causes of smoke in the latter to be: delayed burning of fuel, wrong proportions of air and fuel, changes in temperature and pressure of the atmospheric air and possible variations in fuel oils. Tests on devices controlling smoke emission have not indicated so far that they are worth while; they are not comparable with the improvement obtainable by good design, proper use and good maintenance of engines. It is hoped that the Ministry of Transport will inspect annually all goods vehicles instead of the present "blitzes". The procedure for these smoke checks carried out increasingly by the Ministry's technical staff over the past three years, is described, and also the follow-up action resulting from those checks. As smoke is assessed visually by the vehicle examiners, it would be preferable to have an instrument measurement against a published standard. In the meantime, the present practice of roadside checks by the vehicle examiners is the most effective way of dealing with the pollution from diesel-engined vehicles.

770. Sulphur Dioxide. An Examination of Sulphur Dioxide as an Air Pollutant (Proc. N.S.C.A. Conf., Harrogate, 1964). The result of a year's work by the Technical Committee of the National Society for Clean Air, the report analyses the complexity of problems involved in sulphur dioxide pollution. It examines the different sources of sulphur dioxide pollution and outlines the possible lines of attack on each. The report emphasizes that the problem calls for a variety of contributory solutions and concludes that although there is no prospect in the immediate future of entirely eliminating sulphur dioxide, much can be done to reduce the total emissions of this gas and to reduce its concentration in the atmosphere.

Sunbrite Brochure.—An informative brochure "Modern Home Heating with Sunbrite" has been issued by the British Coking Industry Association. In addition to describing the fuel it illustrates and gives essential information about domestic boilers for central heating and hot water, room heaters, solid fuel cookers, and underfloor draught fires. Reference is made to no less than 48 appliances.

CONTRIBUTIONS TO CLEANER AIR

Industrial and Commercial News

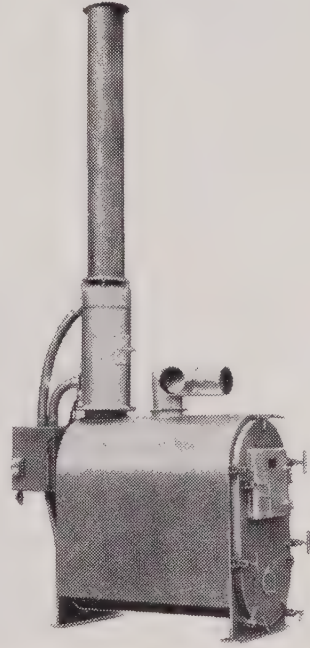
Smokeless Disposal of Refuse

Making its debut at the Harrogate Exhibition was the new Sealed Flame Disposal Unit, the principles of which, the makers claim, render entirely obsolete all previous conceptions of incineration. It is said to be entirely smokeless in operation with every type of refuse, including rubber, plastics, bitumastics, animal and vegetable matter—wet or dry. It can be loaded by unskilled labour and left unattended to incinerate automatically without smoke or odour. Air pollution is eradicated at both ground and stack levels.

The cost of the Sealed Flame Unit is far less than the conventional incinerator and maintenance and operating costs are claimed to be very low.

There are no fire-bars or grates and there is no through draught. It works on the principle of rear-driven forced draught through air tubes, located in the bottom of the curved hearth. Nothing can lie flat; the refuse is contained in a cocoon of air and burns right through under completely balanced conditions. This principle of combustion causes the burning refuse to generate its own gases. Town or bottled gas is used, apparently, for ignition (the point is not clear in the literature).

The patented stack consists of a double sleeve, that is an inner and outer member, incorporating in the design a mixing chamber which converts the highly pre-heated smoke and air mixture into a gas which is ready for instant ignition. That is why the patented afterburner sparks off this combustible mixture with negligible gas consumption. Where an afterburner is applied through a single stack member, it is trying to burn neat smoke from the furnace, or at best, smoke to which cold air has been introduced through the ash-pit or through the stack. This lowers the temperature of the smoke, detracting from combustion. With the patented inner and outer stack member design (Patent No. 930324), once the refractory of the mixing chamber is hot, the incinerator will operate smokelessly for long periods with no gas consumption at all. The sealed front prevents pollution at both ground and stack levels.



The Sealed Flame Disposal Unit

The licensees of this unit, Universal Machinery and Services Ltd., Leeds 12, give every customer an unconditional written guarantee, with no provisos, that the performance will fully and legally meet with the provisions of the Clean Air Act.

Smokeless Firelighter

"Zip" chemical firelighters, shown at the Harrogate Exhibition, are "to all intents and purposes smokeless" and are therefore suitable for use in smoke control areas, the manufacturers, Kay Brothers Ltd., of Stockport, have been informed by the Ministry of Housing and Local Government. At the request of the Ministry, the British Coal Utilization Research Association carried out tests on Zip firelighters which showed that these firelighters added no gravimetrically measurable smoke to that of the fuel they ignited.

An official letter to Kays from the Ministry of Housing and Local Government states: "It is apparent from these tests that 'Zip' firelighters, when used to ignite the test fuels, give substantially the same weight of smoke emission as electric or gas ignition. Since the electricity and

gas give rise to no emission of smoke beyond what is emitted by the fuel ignited, the conclusion to be drawn from these results is that the 'Zip' firelighters tested are intrinsically smokeless".

Mr. D. B. Smith, Managing Director of Kay Bros. Ltd., told SMOKELESS AIR: "Some of the smokeless fuels require a greater intensity of heat to ignite than any chemical firelighters provide, but Zip firelighters are particularly successful with 'Coalite' and 'Rexco' smokeless coals, 'Nubrite', 'Phimax' (produced by the area Gas Board in the North-West), and 'Homefire', the new premium fuel".

Aga Home Heater

Making its first public appearance at the Harrogate Exhibition was a new solid fuel appliance, the Aga Home Heater. It combines in one appliance a boiler in the kitchen and a glass-fronted inset room heater in the living room. It has been produced as a joint effort by the National Coal Board and Allied Ironfounders Ltd.

The boiler is designed to provide domestic hot water from a 30-gallon cylinder and heating up to 125 sq. ft. of radiation surface. The total maximum output of the appliance is 40,000 B.t.u./hr. of which 10,000 B.t.u./hr. is available for heating the living room by convection and radiant heat, and 4,000 B.t.u./hr. local

heat in the kitchen, leaving 26,000 B.t.u./hr. for the hot water supply and the heating system.

The heater is designed to be installed into a house where the living room and kitchen are adjacent to each other. This lay-out is a very common one and it is considered that there will be enormous interest in the Aga Home Heater, particularly by local authorities.

It is labour saving because it only requires refuelling every ten hours when running at maximum output, whilst at lower settings, it may only need attention once in twenty-four hours.

Filling and ash removal are carried out on the kitchen side with the use of a new design of grate and external riddling; there is no need to touch the living room side, other than the damper which controls the fire.

The retail price of the appliance is £75.

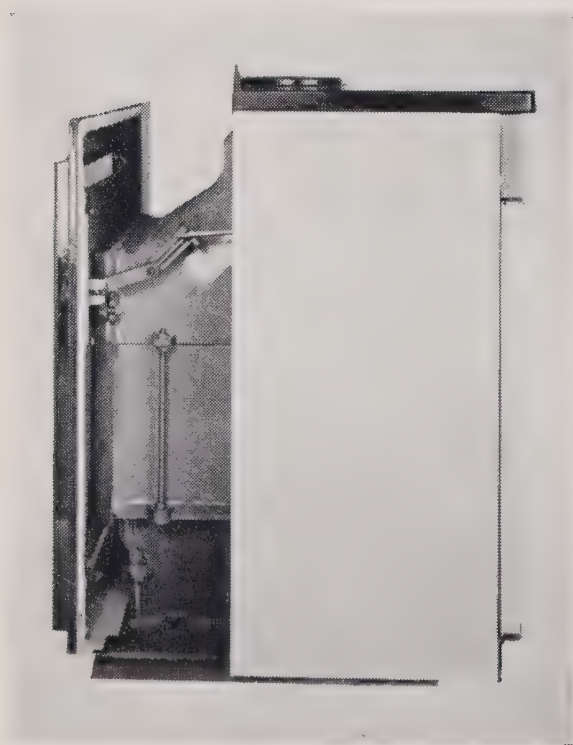
Questions in Commons— Vehicle Smoke

Mr. Bossom asked the Minister of Transport whether he will institute Government research into methods of limiting fumes both from diesel and petrol-driven vehicles, in conjunction with what is being done by engine manufacturers.

Mr. T. Fraser: In common with other European countries, we are in close touch with developments in the United States where there are serious problems of air pollution, notably in parts of California. I do not consider that a special programme of Government research on this subject would be appropriate here at present, but the situation will be kept under careful review.

Mr. Sorensen asked the Minister of Transport if he will give special consideration to further measures for the elimination of exhaust fumes from heavy vehicles.

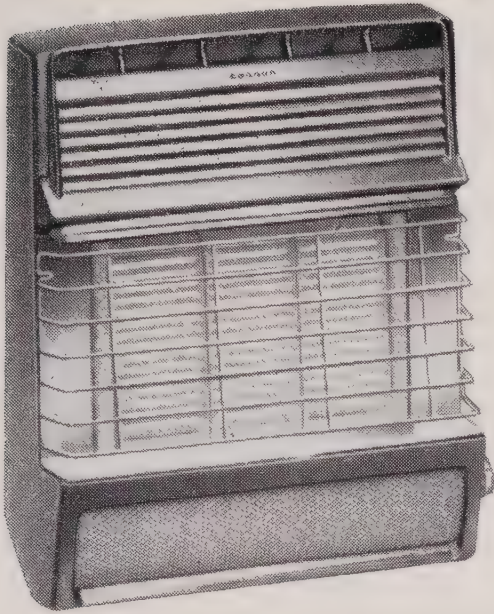
Mr. T. Fraser: If the diesel engine of a vehicle is correctly adjusted and maintained, there is no reason why it should produce excessive fumes or smoke. To induce vehicle operators to take further measures to stop this nuisance, I propose to continue the roadside smoke checks, under which defective vehicles have to be put right and can be taken off the road at once. (November 11, 1964)



The Aga Home Heater—a cross-section showing the living room and kitchen "faces" of the appliance

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Erecting a 200 ft. steel chimney, designed by Head Wrightson Iron and Steel Works Engineering Ltd. The job was done in the record time of 14 days, using three Coles diesel-electric truck cranes. The chimney serves electrostatic precipitation plant on open hearth steel furnaces of the Steel Company of Wales



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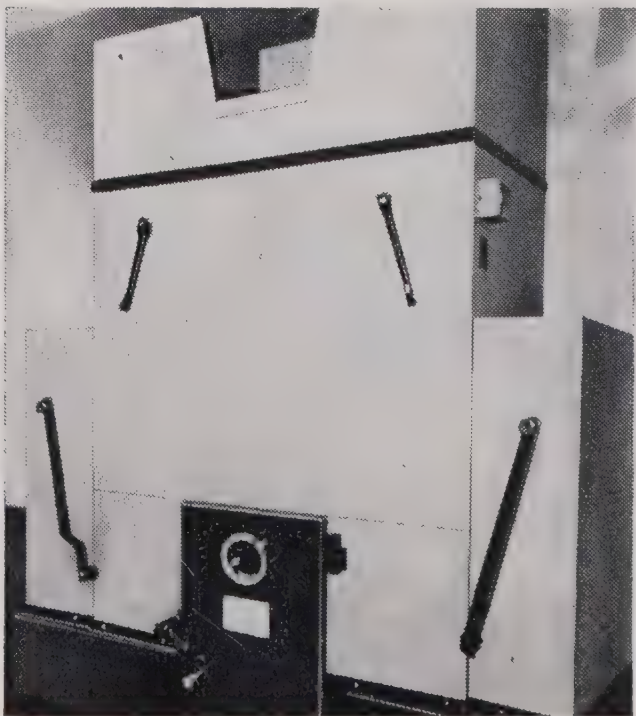
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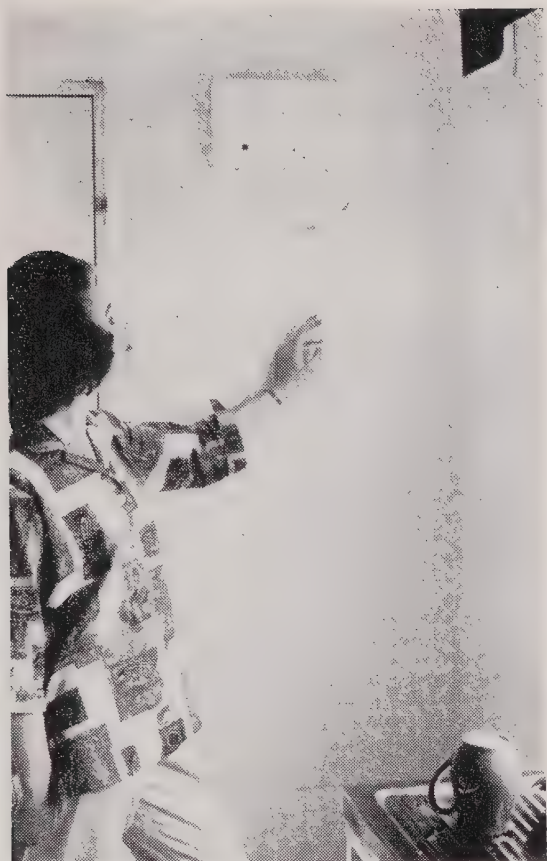
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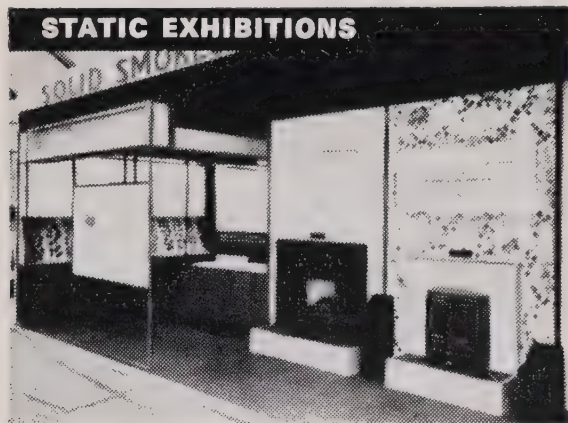
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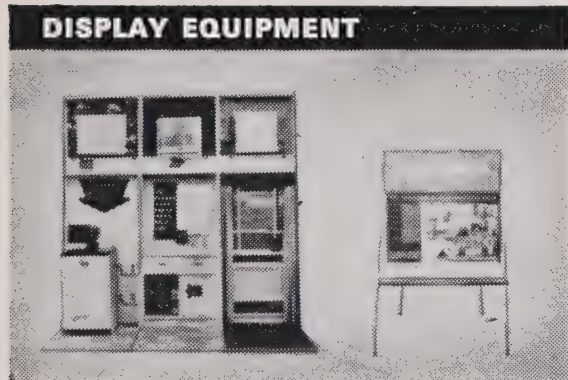
STATIC EXHIBITIONS



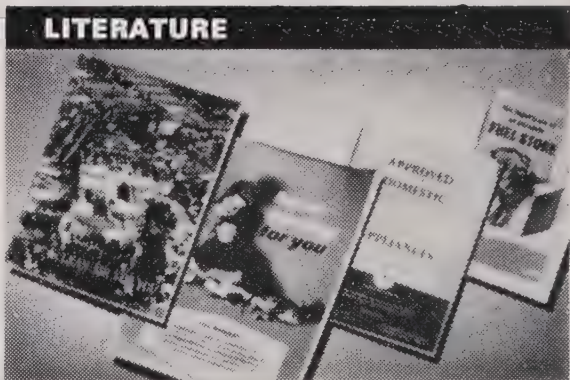
MOBILE EXHIBITION UNITS



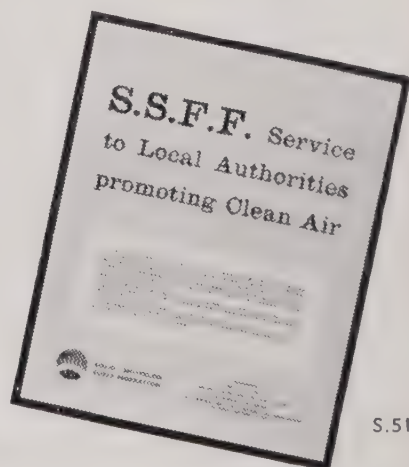
DISPLAY EQUIPMENT



LITERATURE



Local Authorities establishing Smoke Control Areas or organising "Clean Air" campaigns, House Improvement or Conversion schemes should take full advantage of the technical advice and assistance offered free of charge by the Federation. During the past year 161 Local Authorities up and down the country were assisted with the Federation's static and mobile exhibitions, 22 Local Authorities made use of portable display equipment; and more than 200,000 copies of the booklet *Clean Air for You* (now being revised) were supplied for distribution.



Copies of a new publication describing and illustrating the service will be supplied on application to:

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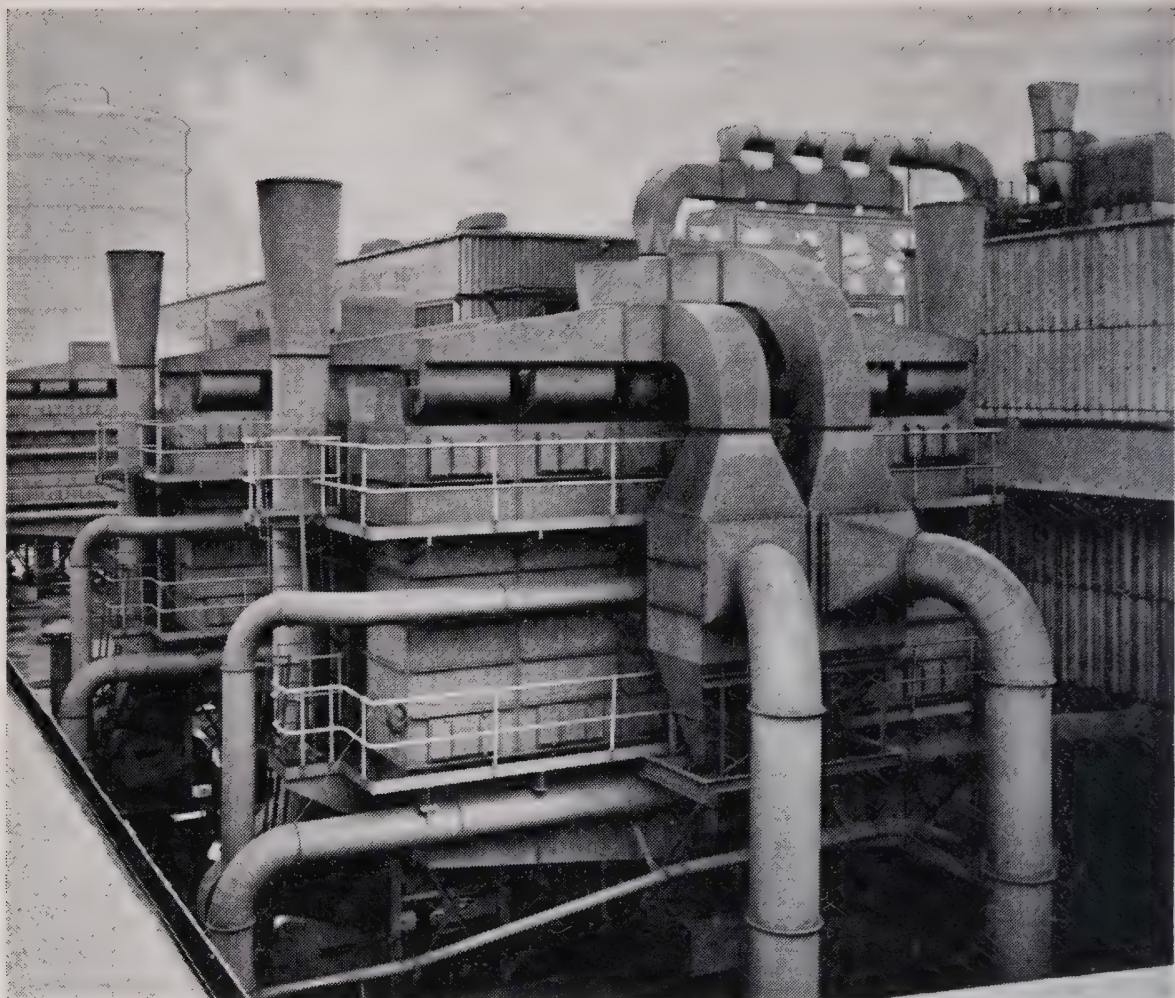


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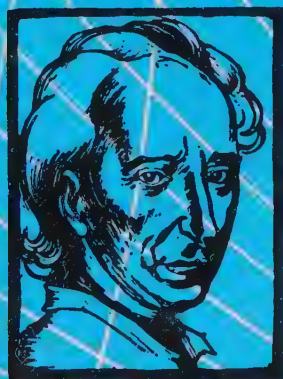
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SMOKELESS AIR

JOURNAL OF THE
NATIONAL SOCIETY FOR CLEAN AIR



No. 133 ★ SPRING 1965 ★ 2s. 6d.

In this Issue

Fluorosis in Cattle ★ Developing a Smokeless City
Dusseldorf Venture ★ Conference in Belfast ★ International News
Chimney Heights Discussion



WHO'S SMOKING?



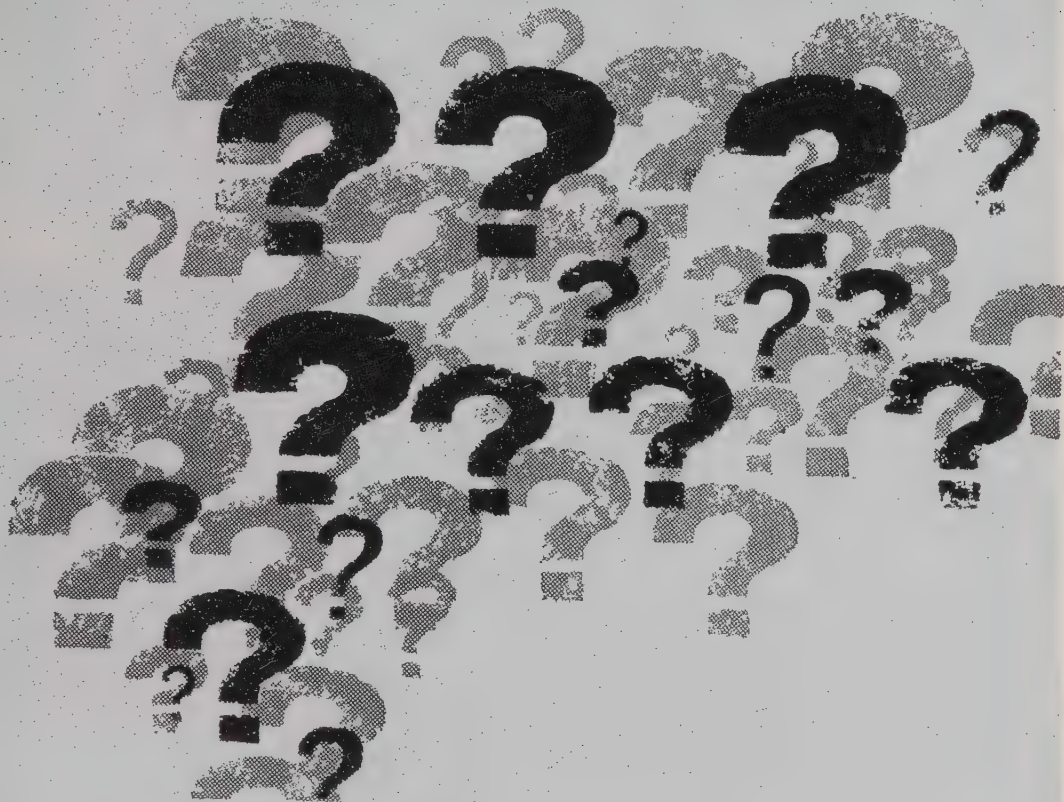
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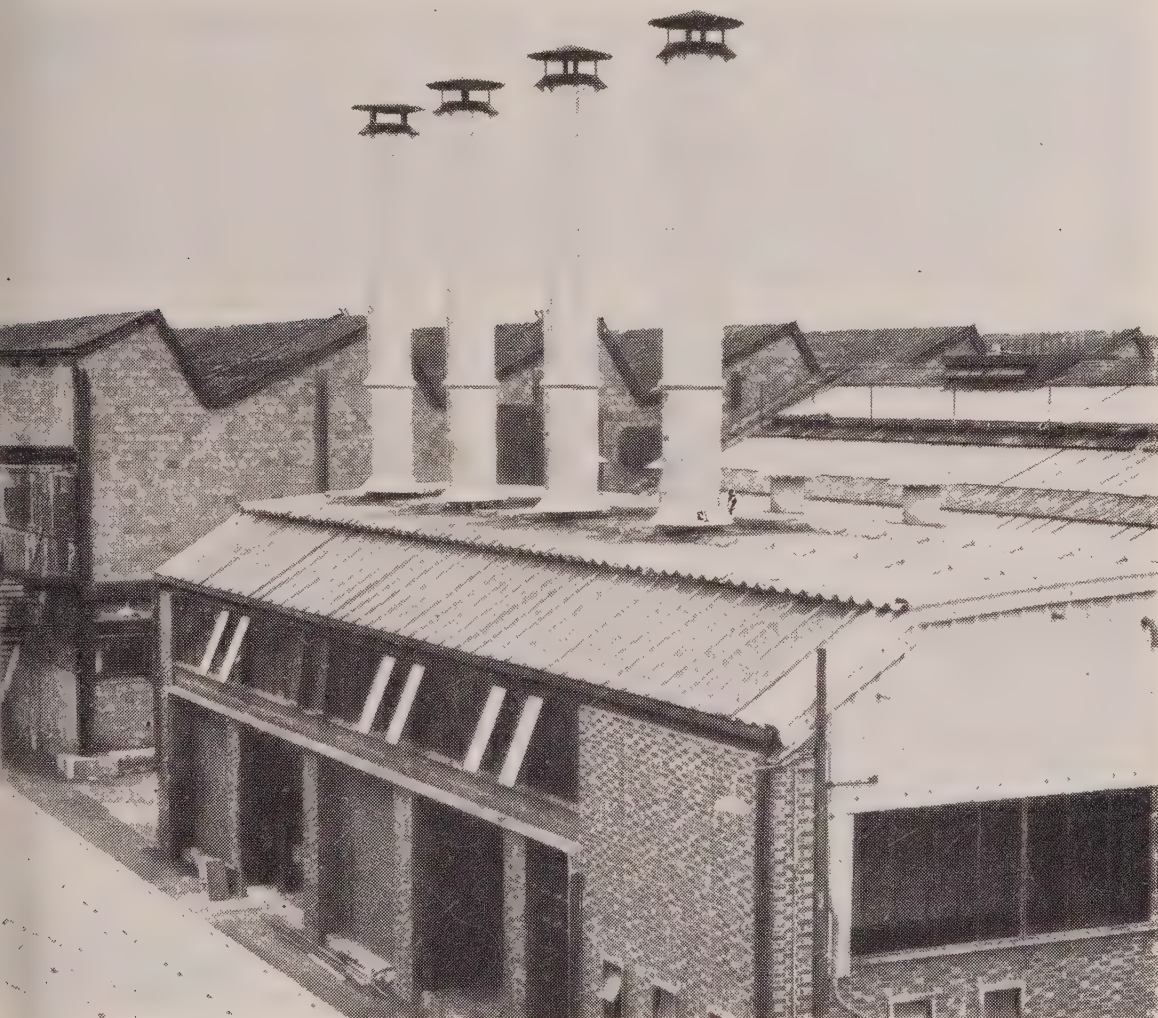
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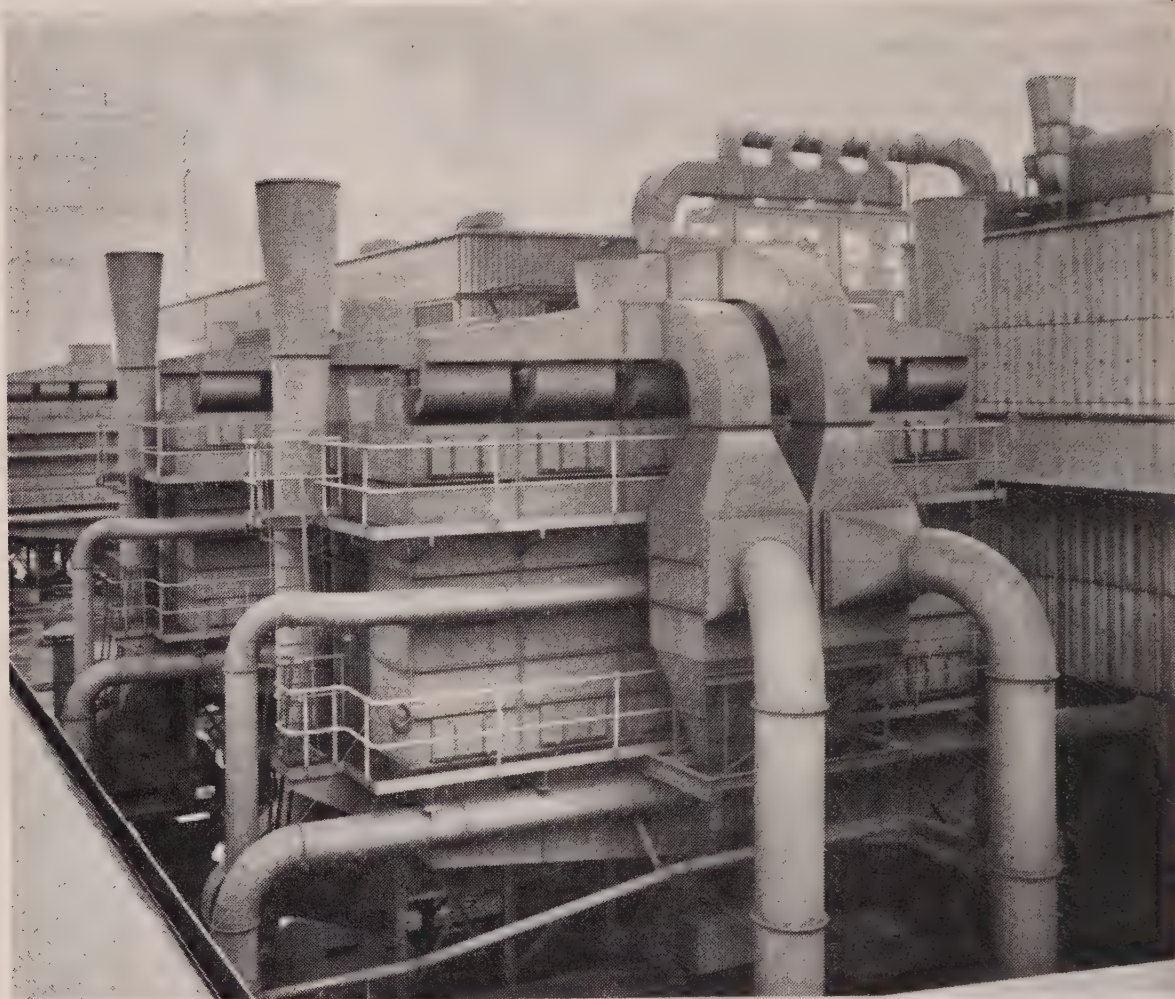
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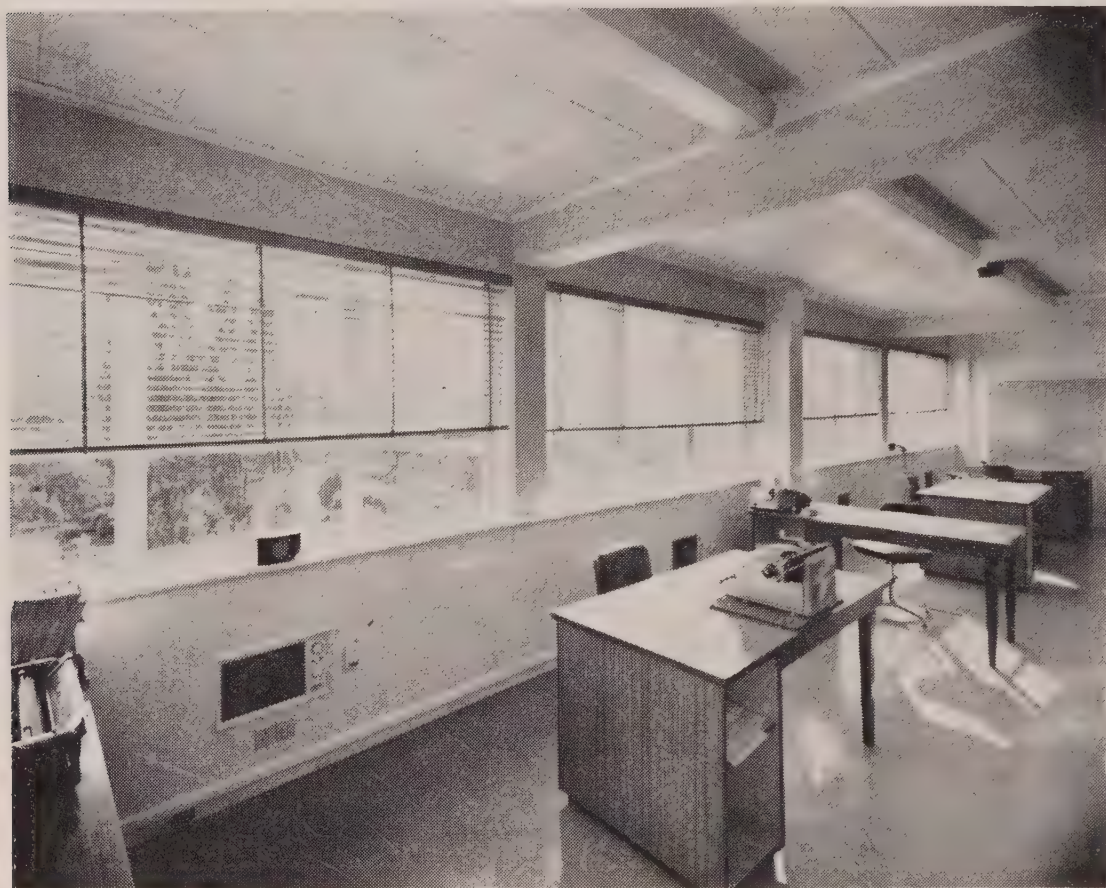
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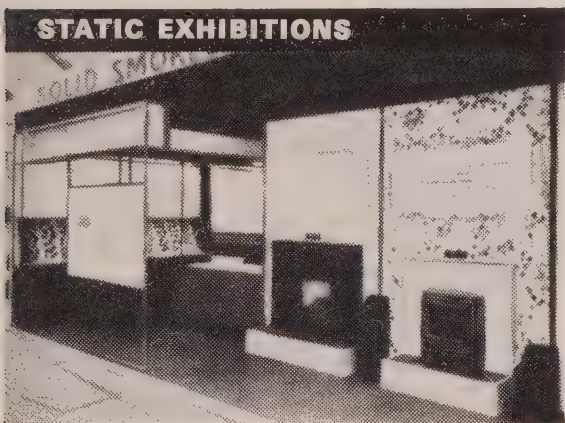


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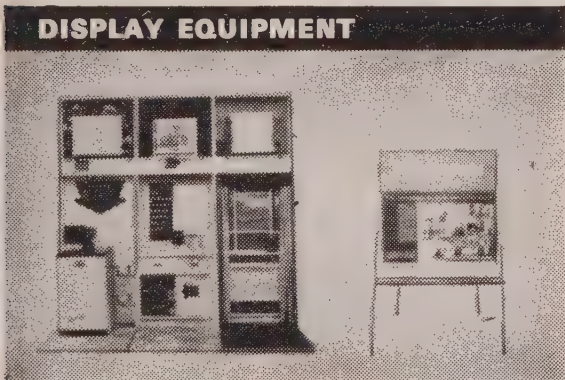
STATIC EXHIBITIONS



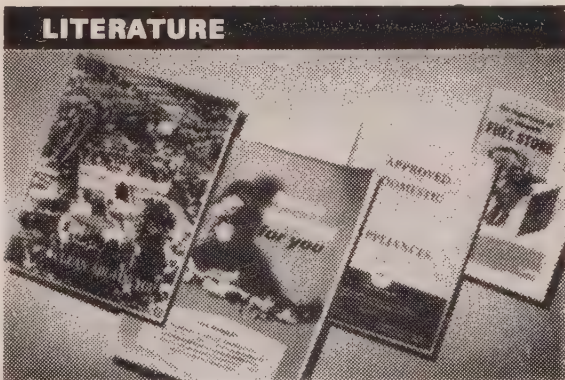
MOBILE EXHIBITION UNITS



DISPLAY EQUIPMENT



LITERATURE



Local Authorities establishing Smoke Control Areas or organising "Clean Air" campaigns, House Improvement or Conversion schemes should take full advantage of the technical advice and assistance offered free of charge by the Federation. During 1964, the Federation's static exhibition, four mobile exhibitions, and various portable display units were utilised by Local Authorities throughout Great Britain for a total period of 209 weeks' showing, varying in duration from a few days to two weeks. More than 300,000 copies of "Clean Air for You" and over 45,000 copies of "Home Heating for You" were also supplied for distribution.

S.S.F.F. Service to Local Authorities promoting Clean Air

For further information, contact the S.S.F.F. Service to Local Authorities, 74 Grosvenor Street, London W.1. The Service is free of charge and is available to all Local Authorities.

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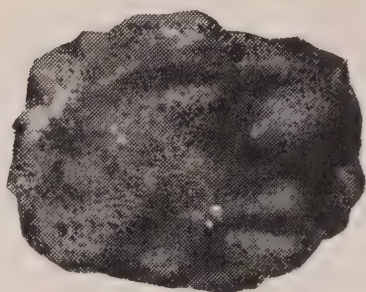
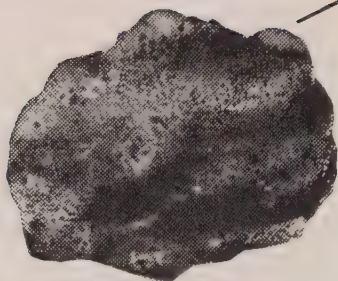
S.51

A modified edition of "Clean Air for You" has now been completed and copies of this, "Home Heating for You", and the publication "S.S.F.F. Service to Local Authorities" will be supplied on request to:—

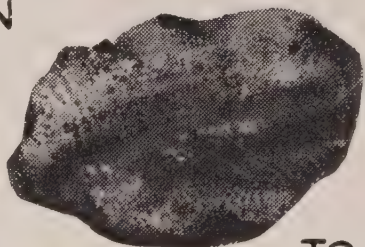
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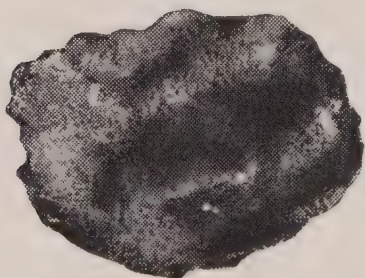


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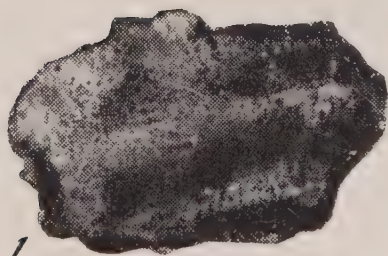


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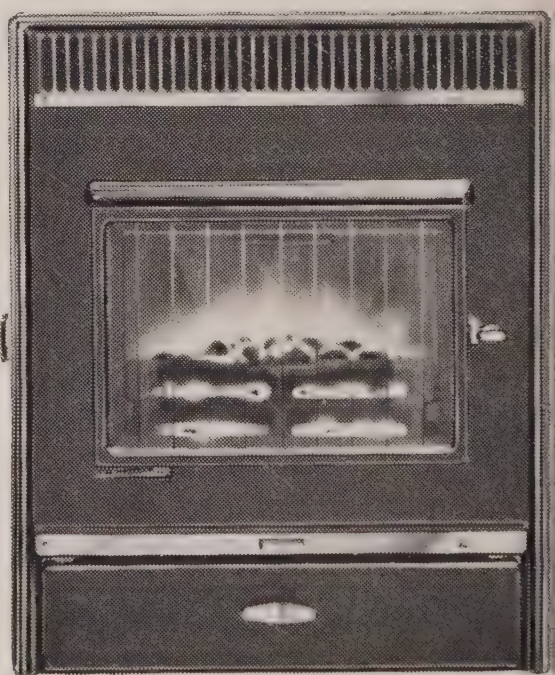
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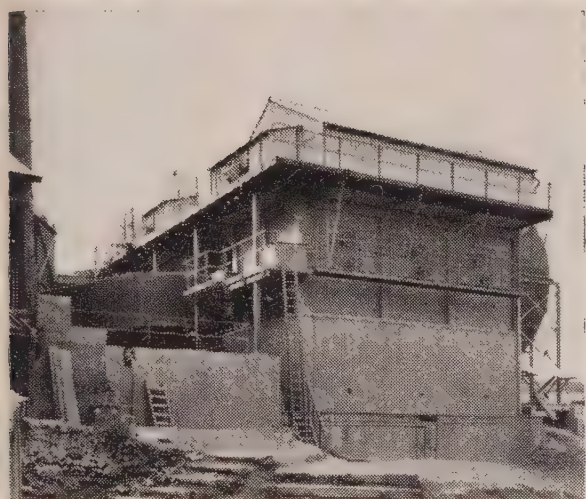


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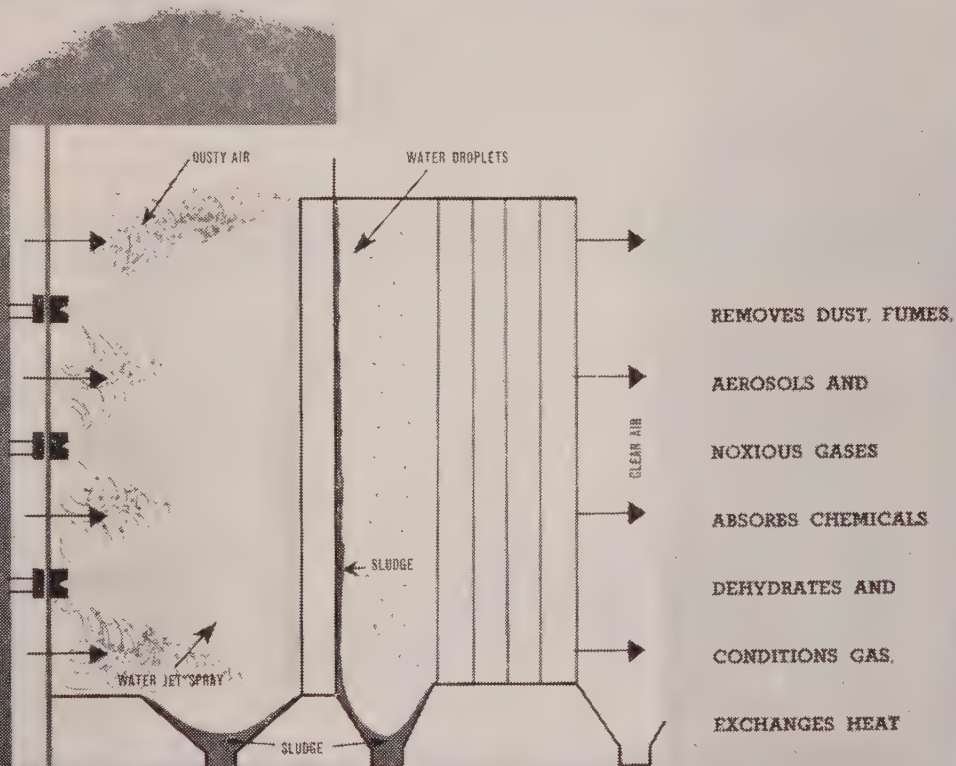
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Report on Sulphur Dioxide 2s., each; 16s. per 12; £6 per 100
Clean Air Lecture Notes (see page 208) 1s. 6d.

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Connaught Rooms, London, 4 May, 1965

A.G.M. (members and representatives) at 11.30. Annual Luncheon at
12.30 for 1.00. Tickets 25s. (see page 185)

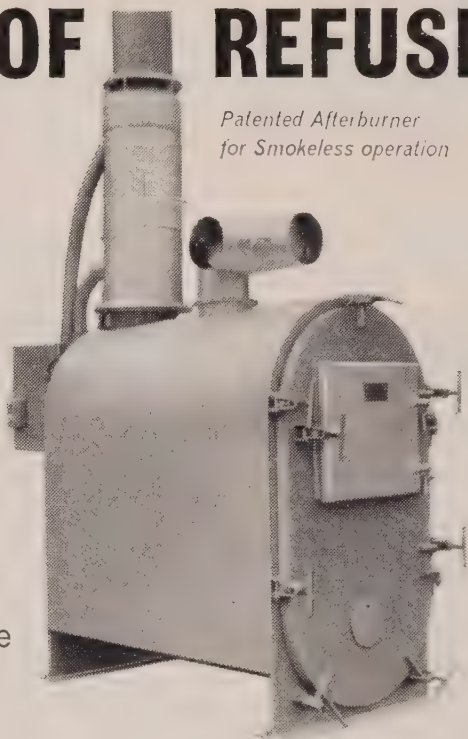
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SMOKELESS AIR

Vol. XXXV No. 133

Spring 1965

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Beauty and the President

WE warmed to President Johnson on reading about his special message to Congress in which he asked for new federal powers to prevent pollution of air and water and to beautify the cities and restore the rural beauty of America. "The form of modern change is threatening to blight and diminish in a few decades what has been protected for generations", he said. "This means that beauty must not be just a holiday treat but part of our daily life."

He said that air pollution was becoming a menace to public health, and mentioned that even the White House was being blackened by soot. One of the principal unchecked sources of air pollution was the automobile, and "I intend to institute discussions with industry officials and other interested groups leading to an effective elimination or substantial reduction of pollution from liquid-fuelled motor vehicles."

It is good that air pollution—along with other spoilers of beauty—is being recognized in this way, not merely as a menace to health and a costly waste, but also as an enemy of beauty, amenity and truly civilized living. The Americans need reminding of this truth, because their cities and countryside are being made drab and ugly, just as are our own. Polluted air, and in this context smoke is the chief culprit, is one of the many persistent foes of beauty, and it is necessary that we should realize this. We would like prominent people in Britain to echo the President's words. It is perhaps a symptom of the malaise

of our materialistic civilization that too many of us seem afraid of talking about and demanding beauty.

The Society's Affairs

We are pleased to be able to announce that at a luncheon to follow the Annual General Meeting in London on May 4, the principal guest and speaker will be the Minister of Power, the Rt. Hon. Fred Lee, M.P. The Minister has been, and no doubt still is being, subject to many pressures on what is conveniently (and sometimes vaguely) called a national fuel policy, and we are looking forward to hearing him speak on aspects of policy that will affect progress towards clean air.

Dr. Parker's term of office as President (and it has been a busy and most helpful term) comes to an end at the A.G.M. and his successor will be in office for the luncheon. The election of a new President will be in progress when this note is published and it would be improper to anticipate its result. Nevertheless, it will be known to all members with voting rights that the nomination being made on behalf of the Executive Council is Sir Alan Wilson, F.R.S.

Elsewhere in this issue is a preliminary outline of the programme for the Eastbourne conference in October. It looks like a diverse and well-balanced series of sessions, likely to appeal to the great majority of our members. Also reported is an account of the Society's unusual role as the organizing body, on behalf of industrial members, at the Dusseldorf

Clean Air Fair in April. It was unexpected, but we are glad to have an opportunity of helping the nation's export drive.

Another item of news is that the Society, and all the other five national associations concerned, have agreed to the draft constitution for an International Union of Air Pollution Prevention Associations, as proposed at the Washington meeting last year. The Union is therefore in being and is at the moment forming its Executive Committee of six—one representative from each national body.

Fluorosis

Our review on another page of the new report on "Fluorosis in Cattle" draws attention to the air pollution problems still unsolved, and which are given little general attention because they affect only small and isolated areas. Locally, they may be most serious, as in this case, and may be regarded as intractable if they are considered by reference to ordinary economic criteria. For the fluorosis hazard to cattle the report suggests two obvious approaches—to reduce emissions as far as may be economically possible (which may not be very far), and simply to cease keeping cattle in the more seriously affected areas. Either course, or both, would do something to make the problem less serious but would leave it unresolved. Palliatives may have to be accepted in this as in many other aspects of air pollution, but they are never entirely satisfactory, and leave unanswered (or even unasked) the question of whether we are certain that all the effects have been taken into account, and therefore whether the economic balance sheet is a true one. And then, beyond this, there may be philosophical doubts on whether the economic criterion is the only one that should be used.

We hope, incidentally, that none of our readers will regard this report, which so clearly shows the ill-effects

of fluorides in excess, as supporting in any way the arguments that are used against the trace fluoridation of water. Fluorine, in the right quantity, is an important element contributing to the health of animals, including humans. Like other elements that make up our systems it becomes poisonous in excess. Its close relative chlorine, for example, was used as a poison gas in the great war, but in association with sodium it is vital to our well-being—as common salt.

A Chance for London

The Joint Parliamentary Secretary of the Ministry of Housing and Local Government, Mr. Robert Mellish, M.P., addressing a press conference recently about the Government's aim to build 35,000 houses yearly in Greater London, gave information on the prospective sites for such large-scale development. These included the land of the Woolwich Arsenal, the Lea Valley, the Croydon and Hendon airports, as well as some railway land. Woolwich in particular was described by Mr. Mellish as a "windfall" which should be an exciting new town within London, built on imaginative Buchanan lines. It occurs to us that this land (and the other areas) could also provide the town-planners of the new Greater London Council with a unique opportunity to build clean air communities, both from the point of view of domestic health and pollution from vehicles. Could not the various fuel and power industries be invited to submit plans for comprehensive smokeless heating, by gas, electricity or district heating? Not only should the new towns be completely smokeless from the start, but they should plan to achieve this by the most efficient and modern methods. Also, as in Woolwich alone there will be room to build homes for 50,000 people, is there not a splendid opportunity for providing one or more generous carless zones, where all road traffic would be banned and where the fortunate inhabitants could

A QUOTATION

For nearly three hundred years Britain, reconciled to the Roman system, enjoyed in many respects the happiest, most comfortable, and most enlightened times its inhabitants have had. Confronted with the dangers of the frontiers, the military force was moderate. The Wall was held by the auxiliaries, with a legion in support at York. Wales was pinned down by a legion at Chester and another at Caerleon-on-Usk. In all, the army of occupation numbered less than forty thousand men, and after a few generations was locally recruited and almost of purely British birth. In this period, almost equal to that which separates us from the reign of Queen Elizabeth I well-to-do persons in Britain lived better than they ever did until late Victorian times. From the year 400 till the year 1900 no one had central

heating and very few had hot baths. A wealthy British-Roman citizen building a country house regarded the hypocaust which warmed it as indispensable. For fifteen hundred years his descendants lived in the cold of unheated dwellings, mitigated by occasional roastings at gigantic wasteful fires. Even now a smaller proportion of the whole population dwells in centrally heated houses than in those ancient days. As for baths, they were completely lost till the middle of the nineteenth century. In all this long bleak intervening gap cold and dirt clung to the most fortunate and highest in the land.

From Chapter III, Vol. 1, of "A History of the English Speaking Peoples", by Winston S. Churchill

stroll and shop—or just stand and stare—in peace and quiet, breathing air free from exhaust fumes?

Chief Commoner

Members of the Society will join us in warmly congratulating our Honorary Treasurer, Mr. Stanley E. Cohen, on being elected as Chief Commoner of the City of London. This is a courtesy title conferred during his year of office on the Chairman of the City Lands Committee—the premier committee of the Common Council. The Chief Commoner is in fact the leader of the Common Council, and for more than three and a half centuries his committee has been responsible for the management of most of the lands and buildings belonging to the Corporation, and the administration of the City's cash—that is, money derived from the Corporation estates and used for such purposes as expenses connected with the Mayoralty and official staff, the Central Criminal Court, the

Magistracy, the Guildhall, the presentation of Honorary Freedoms and the entertaining of distinguished persons.

The post and the title are rightly regarded as honours not lightly bestowed, and are given only to those whose services to the City have been outstanding. Among these services Mr. Cohen has had a great deal to do with the City's housing developments and was responsible, in 1955, as Chairman of the Public Health Committee, for making the City in its entirety a Smokeless Zone.

The Strasbourg Recommendations

In our last issue we gave a summary (p. 122) of the recommendations on air pollution submitted to the Council of Ministers of the Council of Europe by the Social Committee of the Consultative Assembly, following last year's Air Pollution Conference at Strasbourg. The document was received just before we went to press, so that

there was no opportunity of discussing it.

There are 14 main proposals in the report (Document 1827), corresponding to the 14 sections of the conference. As they were outlined in our previous note we need only repeat the headings. They are: Health Animals and Plants, Economic, Danger Thresholds, Measuring (standardization), Apparatus (for measuring), Meteorology, Combustion, Motor Vehicles, Industry, Town and Country Planning, Co-operation, Information, and Legislation.

All the recommendations call for study or research, committee and secretarial organization, and of course time and money. It is pointed out in the report, and has been stressed elsewhere, that the recommendations "should be regarded as constituting a programme of work to be carried out gradually".

This proviso is to be welcomed, for, because the recommendations are given under the 14 main headings, examination shows that they actually include over fifty specific individual proposals for action. Many of these could not in practice be carried out other than gradually. Some, certainly, might be achieved fairly quickly, but others would require years to come to fruition. Some would be helpful in the practical prevention or control of pollution; others are concerned with the more precise evaluation of its effects. Some could be usefully carried out on a European basis; others to have their full value would have to be on a world basis. Some, again, might be developed through existing organizations; others would need their own, new, organizations.

It is not for this Journal to advise the Council of Europe what to do, but as the outcome of its consideration of the proposals must affect progress towards clean air in Europe, including Britain, some reflections may be ventured.

First, it seems to us that the proposals cover such a wide field, perhaps too wide a field, that it would be a herculean task to deal with them all,

except very gradually indeed. Secondly, some are clearly more urgent, and are more quickly capable of being translated into practical results, than others. Thirdly, are they all of equal value in promoting clean air? So much more might be done, here and now, to clean the air that—if it were done—many long-term programmes of research and evaluation would not be necessary.

We hope therefore that the proposals will be scrutinized, co-ordinated, and possibly pruned, to give a workable and realizable programme to secure cleaner air soon, rather than to let progress wait upon prolonged investigation.

A factor which will undoubtedly be taken into account is the present existence of air pollution prevention activities in other international agencies, particularly the World Health Organization, the Economic Commission for Europe and the Council of Mutual Economic Assistance, as well as (for its own problems) the European Coal and Steel Community. As far as we are aware these activities have developed more or less independently of each other. What may be needed is some kind of intelligence centre for Europe, or preferably for the whole world. Perhaps to bring this about could be one of the tasks under "Co-operation" in the proposals?

One of the difficulties of discussing a document of this kind, which brings together the separate conclusions and desires of many persons covering a wide range of subjects, is that the sum total appears to be bigger and more crowded than perhaps it really is. Because the whole looks so formidable the worth of many of the separate parts may be overshadowed and comment may tend to become over-critical or over-anxious. It should therefore be stressed that many of the individual recommendations are most valuable and fully justify last year's conference, marking as they do important advances in European thinking on air pollution problems.

Fluorosis in Cattle

Its Occurrence in Industrial Areas

Fluorosis in Cattle: Occurrence and Effects in Industrial Areas in England and Wales, 1954-57. By K. N. Burns and Ruth Allcroft. *Animal Disease Surveys Report No. 2 (Part 1).* Ministry of Agriculture, Fisheries and Food. H.M.S.O., London, 1964. 10s. net.

THE foreword to this report states that almost all cases of fluorosis (chronic fluorine poisoning) in farm animals in Britain has been caused by the contamination of herbage with fluorine-containing gases and dusts emitted by industrial plants.

Following earlier investigations, Mr. K. N. Burns was in 1953 given the task of making a survey of the incidence of fluorosis in farm livestock. The Biochemistry Department of the Central Veterinary Laboratory undertook analytical work required for confirmation of clinical diagnosis. The survey took place during a four-year period from 1954-57 inclusive, and the present report is an account of the survey findings.

Fluorosis is a condition which develops as a result of the prolonged ingestion of excessive quantities of fluorine compounds. In cattle in Britain it is usually due to the intake of large amounts of these deposited on herbage as a result of certain industrial emissions. To obtain information on the location, extent and degree of fluorosis in cattle and its relation to possible sources of fluorine emissions a total of 832 farms in 21 industrial areas of England and Wales were investigated.

It was found that fluorosis, severe enough to cause economic loss, occurred in 170 farms in 17 districts; of these nine were so badly affected that cattle were no longer kept, 61 were classed as severely and 100 as slightly affected, all of them falling into the "damaging fluorosis category". A very much larger number of farms had cattle showing only dental lesions

without disability, lameness or loss of production.

Affected farms were in the vicinity of certain industries likely to emit fluorine compounds into the atmosphere. These are listed as follows:

(1) Basis open-hearth steel works at Stocksbridge, Rotherham, Sheffield and Middlesbrough were located in extensive and severely affected areas. Slight damage was found near similar works in Wales.

(2) Potteries, tile works, brickworks, vitreous enamel, colour and other light ceramic works were scattered throughout the Stoke-on-Trent area; similar ceramic industries were situated in Wolverhampton, Tamworth and St. Helens.

(3) At Bedford and Peterborough there were large concentrations of brickworks and smaller ones at Bletchley and Edgcott in Buckinghamshire.

(4) Open air calcining of ironstone at Grantham, Lincolnshire, was associated with damaging fluorosis on one farm.

(5) Smoke from large plants burning low-grade coal, such as collieries or power stations on the Yorkshire coalfield, appeared to cause dental lesions, but not damaging fluorosis, in cattle grazing within the area contaminated by the smoke.

The Effects

Lameness in fluorosed animals was responsible for most of the damage and resulted in loss of milk yield and bodily condition and the disposal of some affected animals. The lameness was attributed to changes in the structure of the bone caused by an excessive fluorine concentration, so that fractures of the pedal bone were often precipitated by traumatic factors such as the hardness of the ground.

Dental lesions were the most common clinical effect of fluorosis noted throughout the survey but dental lesions alone appeared to have little



Lower part of limb of severely affected cow (left) compared with that of a normal cow

adverse effect on animal health. However, analysis of the tabulated data showed that severity of the dental lesions was related to the severity of the lameness.

Loss of production, as manifested by reduced milk yield and loss of bodily condition, was found in almost all cows which became lame and was marked in cases of acute severe lameness; there was also loss of production in some non-lame animals and this was related to the district as well as to the severity of the lameness which occurred in the district. The percentage of herds where loss of production in non-lame animals was recorded was higher in the districts where the general industrial environment, irrespective of fluorine contamination, presented difficulties which play a part in loss of production in dairy herds in certain areas. Another possible contributory cause of poor production in some districts was copper deficiency; low blood copper values indicative of copper deficiency in cattle were found in many of the industrial areas.

The levels of fluorine intakes en-

countered in the investigation, states the report, did not appear to have any direct adverse effects on the general health or fertility of the cattle.

The results obtained, continues the report, support the view that no single symptom is definitely diagnostic and an accurate diagnosis and assessment of the severity of fluorosis should be based on several criteria, such as the occurrence of characteristic lameness, dental effects and chemical analyses to show that the amount of fluorine in urine, bone and diet is above the normal range. Bone fluorine concentration is the most informative since it provides an assessment of the fluorine status. Urinary fluorine values give an indication of current fluorine intake but, because of their inherent variation, it is only when the means of a representative number of samples from a large number of herds are available that a relationship between urinary fluorine level and the severity of fluorosis can be seen.

Sources of Fluorine and Topography

Maps of the areas investigated are included in the report. They show that most of the farms with damaging fluorosis were within two miles of a probable source of fluorine emission. The Rotherham area was an exception, as affected farms were found up to nine miles to the north-east of the main concentration of steel works. There was, however, a very heavy concentration of collieries in this area and it seems probable that the fluorine contained in the smoke from the large amount of coal burned for generating power at the collieries could contribute sufficiently to the fluorine contamination to raise it to the damaging level.

In all the districts investigated, farms with dental fluorosis extended over a much greater area than those with damaging fluorosis. For instance, in the Stoke-on-Trent and Yorkshire coalfield areas, dental fluorosis was found six to eight miles distant from the sources.

The distribution of the particulate and gaseous contaminants was in-

fluenced by prevailing winds and topography. These effects could be seen particularly well at Stocksbridge, where almost all affected farms were on the steep N.E. side of the valley up which the smoke from the steel-works was carried by the prevailing S.W. winds. In flat areas like Bedford and Peterborough the distribution of affected farms was not so sharply defined as at Stocksbridge, but the influence of the S.W. prevailing wind was nevertheless evident.

Additional and more detailed data on the association between fluorosis and certain industries was provided by the survey and the maps show very clearly that severe fluorosis was present on farms near the works but was less severe, and in some areas gradually faded out, as the distance from source increased. It was also significant, continues the report, that in all areas, the evidence of fluorosis was greater in the districts to which most smoke was carried by the prevailing wind. This geographical relationship provides strong circumstantial evidence that certain industries are emitting sufficient fluorine to cause fluorosis in livestock in the neighbourhood.

The report says that it has been stated that at least 28 industrial occupations have been associated with fluorine hazards, but some of these are within urban areas and do not concern farm animals. Those which do are listed as follows:

- (1) Production of aluminium by the electrolytic reduction of alumina, where the source of fluorine is a cryolite used as a flux in the small furnaces.
- (2) Brickworks, where the source is usually the local clay, although coal is sometimes a contributory factor.
- (3) Glass, enamel and certain colour works where fluorine compounds are often added to the raw material to facilitate melting and to give the finished products certain properties.
- (4) Calcining of iron-stone where the source is mainly the fluorine-rich ore itself, but the coal (about seven per cent) with which it is mixed for burning often contains appreciable quantities

of fluorine.

(5) Steel and metal works when the method of production involves the use of large amounts of fluorspar as a flux.

(6) Potteries, where the sources are the clay and other materials used in manufacture, and the coal used for heating those ovens which are not electrically fired.

(7) Collieries which may use six to eight per cent of their output for operating the mines themselves; the fuel used for this purpose is usually low-grade coal containing fluorine-rich shale.

(8) Power stations consuming large quantities of pulverized low-grade coal high in fluorine.

One or more of all the above industries, except production of aluminium, appeared from their geographical situation to be sources of fluorine in the areas investigated in the survey. The extent of their contributions is discussed in more detail in the relevant sections of the report. It is added that "smoke from collieries and power stations appeared to contain enough fluorine to cause dental fluorosis as no damaging fluorosis was found in areas where these industries were the only source of contamination."

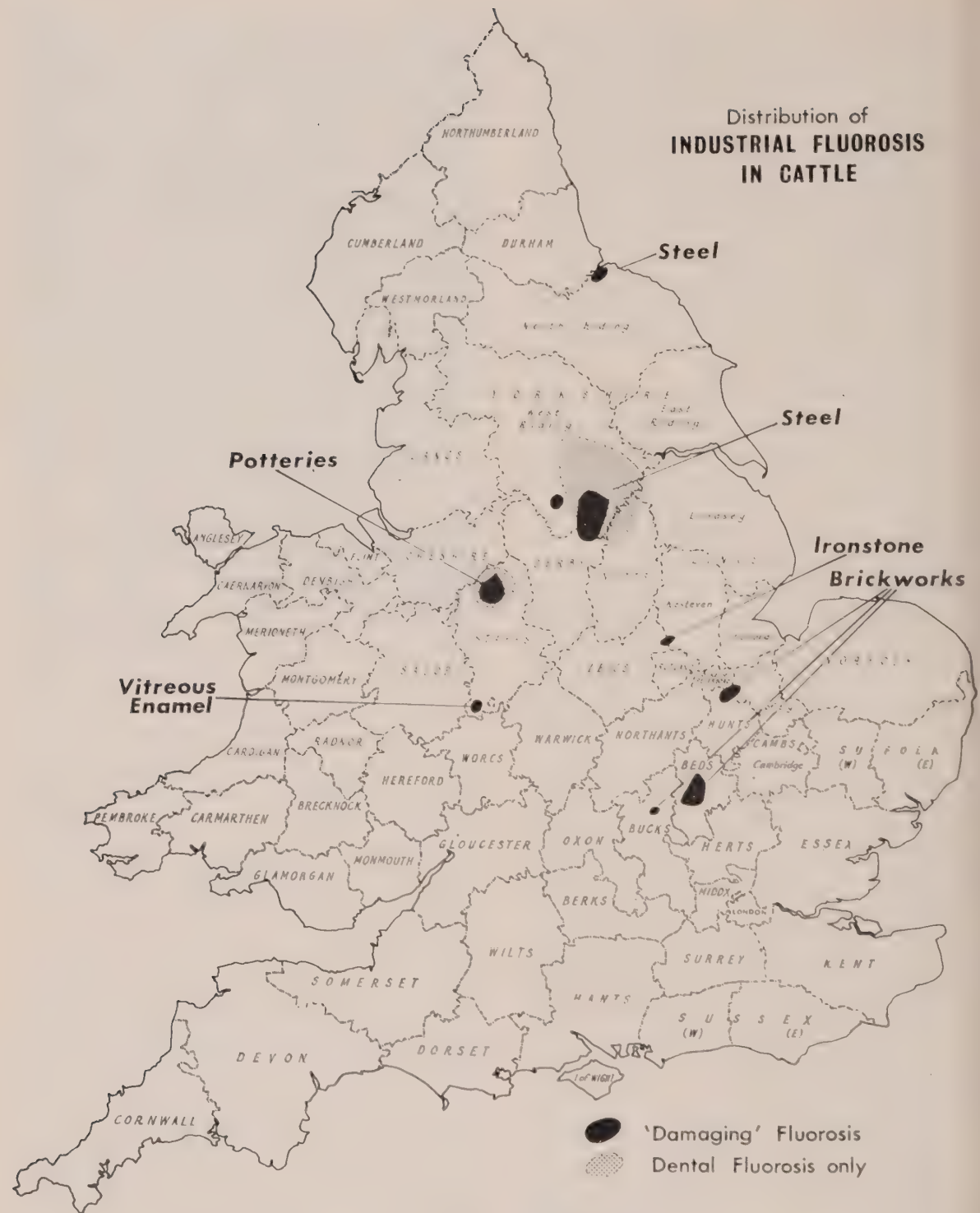
Control

The purpose of the investigation was to report on the situation, not to specify remedial action. Nevertheless the question of control is briefly discussed. It is said that the problem of control is difficult and that the methods used must take into account the economic aspects of both industry and agriculture.

It states that two obvious approaches are:

(i) the reduction of emission by fitting appliances for washing and trapping the gases and particles containing fluorine compounds and thereby preventing atmospheric pollution;

(ii) adoption of a system of husbandry compatible with the fluorine hazard, such as keeping store cattle instead of self-contained herds, so



One of the maps in the Report

that the length of sojourn on affected farms would be reduced, keeping pigs and poultry instead of cattle and sheep, or using the land for production of crops only.

Following this the report continues: "Reduction of emission can be and has been achieved to some extent in some industries, but in others the practical difficulties and the cost would

probably be so great it is unlikely that efficient devices could be installed; the methods adopted to control damage must be dictated by economic considerations in a country so dependent on both industrial and agricultural productions as Britain. In some areas the second method of control, i.e., changing the type of arming; (concluded opposite)

Conference at Eastbourne

This year, for the first time, the Society's annual conference and exhibition will be held at Eastbourne. It will open on Tuesday morning, October 25, (with the usual informal gathering the evening before) and will close at noon on Friday, October 29.

The programme is at present in course of completion but there will be papers ranging over a wide field of topics of importance. Domestic smoke control, fuel distribution questions, and future prospects for the heating of the home, will be prominent. New horizons will be one theme, and it is expected to include prospects for district heating and for gas and off-peak electricity.

There will be a general session with, it is hoped, a paper on a health aspect

of air pollution, diesel smoke control in Belgium, odour control, and problems relating to the dispersion of pollution. On the industrial side subjects likely to be included are the chimney height situation since the issue of the Memorandum, sub-micron dust removal, and a report and general discussion on unresolved problems.

Visits are being arranged (though numbers will have to be limited) to the new nuclear power station at Dungeness, a cement works and a large paper mill.

The Exhibition shows every indication of being as interesting and as comprehensive as its predecessors. Already practically all the space has been reserved.

Fluorosis Report (*concluded*)

to one compatible with the fluorine hazard, may be the best solution. In others, where a number of dairy farms are affected with a moderate degree of contamination not severe enough to make milk production impossible, it would be a hardship for many farmers to change their system of husbandry and the change may not always be in the best interests of agricultural production."

Brierley Hill Cases

Two cases under the Clean Air Act are reported from this authority. In one a refractories firm was fined £10, with five guineas costs, for smoke emission from a brickworks chimney. An observation had shown smoke emission for 12½ minutes, including one continuous period of 6½ minutes. In the other case a private householder was prosecuted for smoke emission in a smoke control area—the first case of its kind taken by the authority. The defendant, who had not heeded a previous warning, was granted a conditional discharge for six months on payment of £5 9s. costs.

THE WEST RIDING COUNTY COUNCIL (General Powers) ACT, 1964.

The importance of Section 27 of this Act, headed Prohibition of Dark Smoke, is stressed in the latter above from Mr. Jennings. For the record, therefore, the whole of the section is reproduced:

27.—(1) As from the appointed day in any district dark smoke shall not be emitted from any industrial premises in that district, and if on any day dark smoke is so emitted, the occupier of the premises shall be guilty of an offence and shall be liable to a fine not exceeding one hundred pounds.

(2) This section shall not apply to:

- (a) dark smoke emitted from a chimney of any building or from a chimney to which section 1 of the Clean Air Act, 1956, applies by virtue of subsection (4) of that section;
- (b) dark smoke accidentally or inadvertently emitted if all practicable steps have been taken to prevent or minimize the emission of such smoke;
- (c) premises controlled under the

Alkali, &c., Works Regulation Act, 1906; and

- (d) premises of the National Coal Board used for colliery production activities as defined in paragraph 2 of Schedule 1 to the Coal Industry Nationalization Act, 1946.

(3) In this section:

“chimney” has the same meaning as in subsection (1) of section 34 of the Clean Air Act, 1956;

“dark smoke” has the same meaning as in subsection (2) of section 34 of the Clean Air Act, 1956;

“industrial premises” means premises used or designed for use for, or held in connection with, the carrying on of any process for, or incidental to,

any of the following purposes, namely:

- (a) the making of any article or part of any article; or
- (b) the altering, repairing, ornamenting, finishing, cleaning, washing, freezing, packing, sorting or canning or adapting for sale or breaking up or demolition of any article; or
- (c) without prejudice to the foregoing paragraphs, the getting, dressing or preparation for sale of minerals or the extraction or preparation for sale of oil or brine; being a process carried on in the course of trade or business; and for the purpose of this definition, “article” means an article of any description including a ship or vessel.

THE DUSSELDORF VENTURE

The Society's Part

The International Clean Air Fair to be held at Dusseldorf, West Germany, from April 5 to 9, will offer participating British manufacturers an excellent opportunity to compete with other countries in the growing market for industrial clean air equipment. To encourage exports in this field the Board of Trade has provided free stand space and arranged for the Central Office of Information to design a British Joint Venture Stand of a contemporary open-plan type. The N.S.C.A. was requested, and has agreed, to act as a co-ordinating, non-profit-making body and to be responsible for the arrangements of the British display. The stand will occupy an area of about 209 square metres.

The Society has welcomed this opportunity to perform a useful service to those of its members and friends in industry who have been able to participate in the venture.

Those who will be exhibiting are:

Dust Suppression Ltd. (Oldings Corner, Hatfield, Herts); **Collectron Ltd.** (Aylmer Road, Leytonstone, London, E.11.); **C. F. Casella & Co. Ltd.** (Regent House, Britannia Walk, London, N.1.); **Beaumont Ltd.** (Rathgar Road, London, S.W.9.); **South**

London Electrical Equipment Co. Ltd. (Lanier Works, London, S.E.13.); **Sturtevant Engineering Co. Ltd.** (Highgate Hill, London, N.19.); **Grayhill Engineering Co. Ltd.** (2259-61 Coventry Road, Sheldon, Birmingham, 26.); **Tool Importers Ltd.** (41-43 Praed Street, London, W.2.); **Warren Spring Laboratory (D.S.I.R.)** (Gunnels Wood Road, Stevenage, Herts.)

The Society, as organizers, will staff an information section and lounge area in which will be displayed a series of murals illustrating the long campaign to achieve clean air in Britain. A full colour brochure for general distribution is being produced for the Stand, and will tell the story of the Society's part in the struggle for clean air, as well as serving as a general guide to the exhibits for visitors to the exhibition.

In conjunction with the exhibition a Clean Air Congress is being organized by the Clean Air Commission of the German Association of Engineers (Verein Duetscher Ingenieure, or V.D.I.). The congress papers will cover a wide field of industrial air pollution prevention and will include one paper from Britain, on “Education and Publicity for Clean Air”, to be presented by the Society's Director.

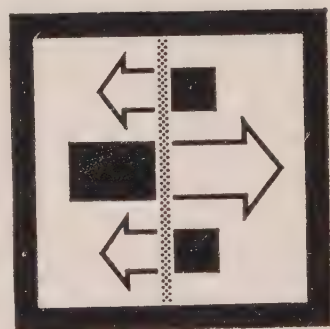
Congress and Exhibition

Clean Air

Düsseldorf, 5-9 April

The demonstration of research and development featuring a wide range of plant and equipment for all branches of industry

Full particulars from:
Nordwestdeutsche Ausstellungs- und
Messe-Gesellschaft, mbH-NOWEA-
4 Düsseldorf 10, Messegelände,
Phone: 44041. Telex: 08584853



SULPHUR DIOXIDE IN LONDON

Minister's Letter

In a letter to the Hammersmith Council, following complaints from the authority "about the rapidly rising quantity of sulphur dioxide discharged into the atmosphere", the Minister of Housing, Mr. Richard Crossman, wrote:

"The important thing is not the amount of sulphur dioxide emitted but the resulting concentrations of the gas reached where the public is exposed to them, namely at ground level. On this point all available evidence is entirely reassuring".

The Minister outlined the success of the policy of high chimneys for large emitters in limiting ground level pollution. The letter continued:

"A considerable amount of research has already been done on means of removing sulphur dioxide from flue gases, but unfortunately a practicable method of doing so has not yet been found. Nor has any practicable means

of removing sulphur from the fuels before they are burned been found".

Hammersmith Council is reported to be making fresh representations to the Minister about smoke emission from the electricity generating station in Fulham Palace road. (*Evening News* report).

POSTAL SURVEY

We have had an inquiry from a local authority which is considering making a postal survey for the preliminary estimates required for making a smoke control area. We have been asked if other authorities have used this method, and as we have no definite information we would be pleased to receive any from authorities who may have done so.

The Mechanism of Corrosion by Fuel Impurities is the title of a new book published by Butterworths. It consists of 44 authoritative papers and runs to 662 pages and is edited by H. R. Johnson and D. J. Littler. The price is £8 8s.

QUESTIONS IN PARLIAMENT

Diesel Fumes and Smoke

Mr. Robert Cooke asked the Minister of Transport what further steps he proposed to take to deal with the nuisance and danger to health caused by the emission of diesel fumes and smoke from road vehicles.

Mr. Tom Frazer: I would refer the hon. Member to the Answer I gave to the former Member for Leyton on November 11.*

Mr. Cooke: No doubt the Minister has this matter very much at heart. Will he do his best to take some new steps in this very difficult matter and possibly seek to make regulations to seal the fuel pumps of these vehicles to prevent the wrongful burning of diesel oil?

Mr. Fraser: We are working on a scheme to prevent overloading in the first place, which often results in excessive smoke being emitted. A British standard for diesel engines is being prepared which we hope will result in their being less prone to emit smoke. I am glad to see that my vehicle examiners report considerable activity on the part of operators to improve their vehicles.

Mr. Webster: Will the right hon. Gentleman make publicly known that it is the duty of the public, and that the machinery exists, to report such instances if they are seen? Will the right hon. Gentleman publish locally where such reports should be sent when these offences occur?

Mr. Fraser: I should like to consider that suggestion.

Mr. Woodburn: Will my right hon. Friend keep in mind that one of the most important defects occurs when a driver has been driving for far more than the permitted hours and is not in a fit condition to keep his eyes on the road and that this becomes dangerous to other drivers? Is my right hon. Friend aware that if the driver is in charge of a defective vehicle the danger is very much worse?

Mr. Fraser: I take my right hon. Friend's point but I think he will agree that he has taken me a good deal beyond the question of the emission of diesel fuels. (*January 20, 1965*).

*See *Smokeless Air*, 132, p. 160.

Air Pollution (Benzpyrene)

Mr. John Hall asked the Secretary of State for Education and Science if the Medical Research Council's Air Pollution Research Unit has been able to estimate the amount of benzpyrene likely to be inhaled each day by residents of densely populated cities; and what study he has made of the conclusions of Professor F. C. Pybus, a copy of which has been sent him, in which it is pointed out that atmospheric pollution is a most serious cause of lung cancer and of cancer generally.

Mr. Crosland: The Unit has made estimates of the kind referred to in the Question; the most recent measurements show that an active person might inhale half-a-microgram of benzpyrene per day in the City of London. In residential areas of London and some provincial towns the amount might be twice as much. Only a small fraction of this, however, would be retained in the lung since the majority of smoke particles are exhaled.

I am advised that the main conclusions drawn by Professor Pybus are not supported by the evidence. Although air pollution may play a part in the production of lung cancer, research to date has not provided evidence of a direct causal relationship. (*February 4, 1965*).

OBITUARY

We regret to record the death, in August last, of Alderman John Chapman, M.B.E., for many years a member of the Newcastle upon Tyne City Council, and a member of the Executive Council of the Society from 1948 to 1964. Alderman Chapman was also actively concerned with the North East Division of the Society for many years.

We also regret to have to record the sudden death, on December 16 last, of Mr. A. J. M. Henshaw, Managing Director of W. C. Holmes & Co. Ltd. He was 47.

Just before printing we were sorry to learn of the sudden death of Mr. J. H. Orr, Sales Director, Coalite and Chemical Products Ltd.

Developing a Smokeless City

J. W. Batey, D.P.I., M.I.Mar.E., F.R.S.H.

*Chief Smoke Inspector, Sheffield and District Clean Air Committee**

IT is difficult to realize the problems of a smokeless city. There never has been a smokeless city in this country and to have suggested there was a possibility of producing a large industrial city free from smoking chimneys is something which would have been thought completely impossible some ten years ago.

None the less in Sheffield it is becoming a practical possibility and by 1972, if all goes well, we shall have a city as free from smoke as it is possible to obtain under present conditions. There will be no more than three or four works emitting smoke or fume, and domestic smoke will be a thing of the past.

We must not take too much credit for achieving such a remarkable transformation. It is a salutary lesson to go back one hundred years and to consider the thoughts, opinions, ideas and inventions which were being disseminated in the golden age of steam. From the *Journal of the Society of Arts*, 1853-4, one can read of a chain-grate stoker; the description being as follows:

"... a strong cast-iron frame of the full width of the furnace and about three feet longer. The firebars are all connected together, forming, when complete, an endless chain, and are made to revolve round a drum, placed at each end of the frame. The front of the frame is provided with a hopper, in which the fuel is placed, and a furnace door, which opens vertically with a worm and pinion. The height to which this door is raised by the stoker regulates the supply of coal, which is carried into the fire by the gradual motion of the bars.

"The whole machine was on wheels to facilitate withdrawal for repairs, and the speed of the bars varied from $1\frac{1}{2}$ to 3

inches per minute; all the air was primary.

"In 1849 brewing coppers were fitted with this 'chain grate' stoker, and though signs of tribulation can be read into such remarks as the side frames and driving gear were too weak and the machine generally was imperfectly put together, or the furnaces were remade with greater exactness, yet the work continued until fourteen such stokers were fitted at a cost of £3,000. The total money saved by being able to burn inferior fuel was, in 1848, £69 4s., and in 1853, £2,000, a gross saving over this period being given as £8,338, from which is 'deducted for casualties' and sundries £350.

"Another interesting figure is the total coal consumption of the brewery, which is given as approximately 6,000 tons per annum."

The Royal Mint had four such stokers on four boilers and two on two annealing-furnaces, "and the two furnaces produced scarcely any smoke". Pre-heated air by the use of hollow bars, moving alternate bars by means of an eccentric shaft at the front of the furnace, moving bars placed transversely in the furnace and operated by cams, splitting the air supply to produce turbulence, revolving grates, sprinkler stokers, were all being produced and used with varying degrees of success.

Another method adopted to consume the smoke was to divide the furnace longitudinally with a vertical wall, each half was then fired alternately and by manipulating dampers, the gases evolved in one half after firing were passed over the top of the wall and into the half of the furnace which was incandescent.

A Domestic Fire

On the domestic front, Neil Arnott, M.D., F.R.S., produced a smoke consuming and fuel saving fireplace, which is described as follows:-

*An Address to the North-Western Fuel Luncheon Club, December 2, 1964.

"The charge of coal for the day is placed in a box immediately beneath the grate . . . and is borne upwards as wanted by piston in the box, raised simply by the poker, used as a lever, as readily as the wick of an argand lamp is raised by its screw; the fire is thus under command, as to its intensity, almost as completely as the flame of a lamp. There are notches in the piston rod for the point of the poker, and a ratchet catch to support the piston when the lever is withdrawn.

"To recharge the box the fire in the grate was temporarily held up by a flat shovel 'pushed in upon the piston and it becomes at once a temporary bottom to the grate and a lid to the coal-box'.

"The piston was then lowered and the box (which held 20 to 30 lb. of coal) was then filled up with coal. Its 'tenacity of life' was equivalent to our modern all-night burner, for the 'air will dive into the coal-box and keep the fire there gently alight like a torch burning from the top downwards!'"

The City of Sheffield had bye-laws in force in 1854 and consulting smoke inspectors to enforce them. In 1856, 45 convictions are recorded against manufacturers and 13 furnacemen were fined small sums for negligence. The time standard in those days was 15 minutes black smoke in the hour.

Even earlier than this, in 1829, a circular was sent to all proprietors of steam engines, impressing the determination of the Improved Commissioners of Sheffield to prosecute offenders. Lots were drawn from amongst the six worst-smoking chimneys noted and proceedings were taken against the unlucky one.

From this brief résumé of efforts made in the past, it is obvious that the necessary ingredients to produce a reasonably clear industrial chimney were available; all that was missing was the legislation.

In 1956, local authorities were at last given the power to clean up the air and Sheffield set about the task with a will. As some of you will know, metallurgical processes in general come under the control of the Alkali Inspector, but Sheffield considered that sufficient local knowledge was available to control all fuel burning

processes in the area, and special dispensation has been given to the local authority in this connection.

Smoke Control Areas

There was already a movement afoot in the area to reduce air pollution, but with the new standards set by the Clean Air Act, this movement was accelerated and with the worst chimneys coming under control, it was considered that the problem of the formation of smoke control areas could be tackled on a big scale. How useless it would be to ask a householder to convert his fuel burning appliances to smokeless conditions, if he were living in the shadow of a chimney pouring forth smoke!

A start was made in the city centre with an area of about 500 acres and all the various Corporation departments were consulted in order to ensure that city developments were taken into account when planning the first smoke control area. This led to the area being of irregular shape after taking into account such things as new roads, new housing development, slum clearance areas, etc., which proved extremely difficult to handle and resulted in administrative difficulties.

Thereafter, it was realized that to accomplish worthwhile results large areas would have to be tackled, a large organization was required, a large amount of money was necessary; in other words everyone concerned with the project had to "think big".

It became apparent from early in the planning stage that the advantages of using ward boundaries far outweighed the disadvantages, and the formation of smoke control areas now is done on a ward boundary basis. Probably the greatest advantage of following this plan is that the boundaries are already marked on maps, and that a list of the names and addresses within the boundary is obtainable from the electoral rolls.

The wards selected as a starting point for the major programme were situated on the south-west side of the city because in Sheffield it was found



The New Sheffield—looking east towards the city centre. In the middle distance, right, is the tower of the Town Hall and, left, the Graves Art Gallery

(Photo by courtesy of Sheffield Newspapers, Ltd.)

over a ten-year period, that the prevailing wind comes from this direction.

Staff had to be recruited and trained, and a case had to be made out to the Establishment Officer for the employment of 15 survey assistants, one supervisor, one chief clerk, and three clerical assistants, and one secretary.

Training had to be given to the staff, who were recruited from all walks of life and systems had to be devised which would be simple to operate, easy to find, and indicate the fuel burning apparatus installed in any house, the name of the occupier, the name and address of the owner, the amount of grant allowed to convert the house, the name of the contractor, when the house was surveyed and by whom, and many other details.

The co-operation of the fuel industries was sought in training the staff and this co-operation was given in full measure.

Most of the survey assistants are women and by commencing with two women who had had experience in

the fuel industry and building up this from nucleus, the full staff were capable of dealing with all aspects of the work within a period of about three months. Specialization amongst the staff is not allowed and they must all be capable of carrying out any aspect of the job.

The number of houses in a ward varies from about 5,000 to 8,000 and to visit every house in an area of a few thousand acres, maintain correct records, estimate the cost of conversions, write to all the tenants and all the owners of all the property when a Smoke Control Order has been confirmed is a job of some magnitude which requires enthusiasm as well as the ordinary skills.

The general public are invited to call at the office if they have any problems or queries and two inquiry offices are manned 5½ days per week. Many calls have to be made at night and on Saturday mornings, and it is not uncommon for the whole staff to be engaged on such calls at night-time for which no remuneration is ever asked or claimed.

10,000 Houses a Year

The rate at which houses are being dealt with is working out at about 10,000 per annum. The total cost of conversions runs at about a quarter of a million pounds per annum, and with the rate of progress being maintained, the whole city, covering 40,000 acres with half a million inhabitants will be converted to smokeless condition in eight years' time.

Much anxiety has been expressed both in Parliament and elsewhere on the availability of smokeless fuels and to convince my Council of the picture which we have in Sheffield, a meeting of all the fuel industries was called some weeks ago, when estimates were placed before them which covered the complete programme. All the industries have given firm assurances that the necessary fuel will be available to meet the full programme. It is worth noting in this connection that in those fireplaces which require conversion, at least 40 per cent turn to gas, and about 10 per cent to electricity.

At the time of writing, there are in round figures about 15,000 acres and 45,000 premises under Smoke Control.

Progress in Industry

Turning to the Industrial side, there is no doubt that industry, realizing the implications of the Clean Air Act, have put their house in order. The number of exemptions which were requested for hand-fired furnaces when the Clean Air Act became effective in 1957 was 148, and today there are no hand fired furnaces left.

The smoke which is occasionally emitted from industrial chimneys today is of short duration and is invariably caused by lighting up a furnace, or mechanical difficulties. However, it is still occasionally necessary to prosecute a firm who have not paid due care and attention to the manipulation of the plant.

A particular problem in Sheffield is

the arresting of fumes generated during steel melting when oxygen is blown into the liquid fuel. This process generates a tremendous amount of brown fume, sufficient to obscure roadways and which is visible for many miles. Arrestment plant designed to eliminate this fume has been the subject of talk and intensive study by various manufacturers and successful fume arrestment is now an established fact in the steel industry. All plants vary somewhat and there is still some way to go before all steel plants can be considered satisfactory, but there is no doubt that the major problems have been solved and that in the next few years, all steel plants will have satisfactory fume arrestment.

It should be noted here that there is no return to the steel-maker for fitting plant of this nature and the capital cost is approximately £1,000 for every ton capacity.

Progress of this nature should be reflected in the pollution measurements which are taken throughout various stations in the city and it is worth recording that since the first smoke control area became effective in 1959, the smoke concentration throughout the whole city has been halved, and that the solid deposit gauge usually having the heaviest reading has shown a downward trend, which since the passing of the Clean Air Act in 1956 has dropped from 430 to 300 milligrammes per square metre and is still continuing its downward trend.

There is no doubt in my mind that Sheffield is now one of the cleanest industrial cities in Europe, and that the City Fathers of over 100 years ago had the desire, but no law to make it clean. I would quote from the preface of a play written by G. B. Shaw:

"It was believed that you could not make men good by Act of Parliament, we now know that you could not make them good in any other way."

There is one thing of which I am certain: the last breath which I take will be much cleaner than the first.

NEW BOOKS AND REPORTS

Environmental Change and Resulting Impacts on Health. World Health Organization Technical Report Series No. 292, 24 pp. WHO, Geneva, 1964. (Obtainable from H.M.S.O., 3s. 6d. net).

This report by a WHO Expert Committee covers a great deal of ground in broad terms, without discussing in detail any of the environmental changes it surveys. These are: ionizing radiation, air pollution, water and waste water, solid wastes and food hygiene. A summary gives main conclusions, and other important factors are mentioned. The report is concise and to the point and its value lies in the way it gives perspective to the changes in the impact of the various environmental factors that are being experienced as a consequence of the many developments in human living conditions taking place in all parts of the world.

In the section on air pollution there is little that is factually new, though the emphases made are of interest. It is useful that air pollution should be stressed in the report and should be given a paragraph in the summary, even though in terms that are not outstandingly profound:

"Air pollution, while a serious threat to susceptible individuals in the high-density urban or industrial areas where it occurs, is not, relative to other health problems, a major one affecting the whole modern world. Continuing efforts must, of course, be made to avoid creating fresh problems in the developing countries and, as money and priorities permit, to abate existing problems."

Particulate Clouds, Dusts, Smokes and Mists. H. L. Green and W. R. Lane. 471 pp. 2nd Edition. Spon, London, 1964. 84s. net.

We reviewed the first edition of this comprehensive work on its publication in 1957, and can commend this

revised and enlarged second edition. Much of the original work remains, and there are no changes, for example, in the plates, but it does incorporate advances that have been made in the science of particules during the intervening years.

The first part of the book deals with the basic physics of suspended particles in gases and clouds, with special reference to their formation, stability, optical properties, measurements and aerodynamics. The second part covers the industrial and environmental aspects of the subject treated from a practical and descriptive point of view.

There is a chapter on atmospheric pollution and other topics considered are the health hazards due to industrial dusts, radioactive aerosols and tobacco smoke, while useful applications such as aerosol therapy, insecticidal aerosols in agriculture and weather modification are also discussed.

The work is of course fully scientific in its treatment of its complex subject matter and will be a valuable aid to those studying the problems of air pollution from fundamental considerations, or developing practical applications and procedures based on such considerations.

There is a new foreword by Sir Harold Hartley, which helps one to appreciate the Porton background to the book. Needless to say, there are many, well-classified references to the considerable literature on the subject.

London County Council: Annual Report of the Scientific Adviser, 1963. 84 pp. L.C.C. Public Health Dept.

The extent and scope of the work carried out by the Scientific Branch of the L.C.C. Public Health Department is always astonishing, including as it does the testing of building

materials used, and of foodstuffs, paints, plastics and drugs and many other subjects, as well as the air breathed by London's crowded millions.

Of interest to this journal are the sections on air pollution, the ventilation of vehicular tunnels, and environmental radioactivity.

The report records a further reduction of nine per cent in the average smoke concentration for the year. It continues: "The introduction of the Clean Air Act in 1956 was followed by a succession of mild winters and it has been uncertain how much of the subsequent improvement in the cleanliness of London's air could be attributed to favourable weather or to measures taken under the Act. This doubt has been dispelled by the outstandingly severe winter of 1962-3 and the benefit of cleaner air now has the appearance of permanence. Even further improvement may be expected as the boroughs pursue their clean air policies".

Criticisms are often heard of a sense of stuffiness in modern air-conditioned buildings, and the report has a word to say on this: "Samples of air from a new block of modern offices ventilated by a plenum system were found to be of satisfactory quality, despite complaints of poor ventilation. This type of complaint, which has occurred before, appears to be attributable to a lack of sufficient air movement at the rather high temperature usually maintained, and possibly also to the psychological effect of closed windows in fine weather".

One paragraph may be quoted in full:

"The problem of building high blocks of flats in the vicinity of existing power stations and factory chimneys is growing in importance, and advice on the air pollution aspects has been increasingly sought at the planning stage. The behaviour and dispersion of chimney plumes is complex, being dependent upon meteorological factors such as atmospheric turbulence and temperature gradients, wind speed

and wind distribution, in addition to topological features and factors such as chimney height and the quantity, temperature, composition and velocity of the effluent gases. Several theoretical treatments of the problem exist, though the experimental data required for verification of the usually complex mathematical formulae adduced are rather sparse. The Council's computer was successfully employed for evaluating tables of predicted concentrations of flue gas constituents over a wide range of distances and heights under a variety of circumstances from one of these formulae; the tables have been found helpful in several instances. Further study of the problem is still required.

On the weekly tests of the atmospheric conditions in the Blackwall and Rotherhithe tunnels, at times when the tunnels are carrying heavy traffic, the report says that in general the exhaust gases were diluted to a tolerable level in respect of toxic components. The average concentration of carbon monoxide measured during periods of heavy traffic was 92 ppm by volume in Blackwall tunnel and 82 ppm in Rotherhithe tunnel. Only 1.5 of these tests showed figures exceeding 250 ppm, the maximum being 340.

Year Book of the Heating and Ventilating Industry 1964-65. Technitrade Journals Ltd., in collaboration with the Heating and Ventilating Contractors' Association. 15s. (postage 1s. 6d.)

This, the 18th edition of a very useful year book provides in one compact volume of 626 pages technical, contractual and other trade information for the benefit of architects, consulting engineers, surveyors and others concerned with the heating and ventilating industry.

City of Leeds

Edited by James Goodfellow, Chief Public Health Inspector, the City of Leeds has issued an attractive sixty page booklet that gives the citizen helpful information about House Improvements and Clean Air.

INTERNATIONAL SECTION

U.S.A.

EXHAUST CONTROL DEVELOPMENTS

A REPORT from the U.S.A. in our last issue (p. 121) described the confusion that has arisen as a result of the motor car manufacturers intimating that they intended to produce (for the State of California only) cars with modified engines designed to meet the requirements of the California exhaust gases control legislation. This it was said had dampened the interest of the manufacturers of devices for which approval was being sought and which had been developed (by eight firms) as a result of much research and heavy expenditure.

Four of the major car manufacturers have now announced that they will have pollution control systems of their own installed in almost all 1966 model cars to be sold in California. The firms are General Motors, Ford, American Motors and Chrysler.

The Chrysler system has been approved by the Californian authorities. The method is said to be relatively inexpensive, mechanically simple, and does not interfere with the engine's performance. It consists essentially of an overall engine modification or detuning, designed to prevent residual hydrocarbons and the formation of carbon monoxide.

It has three components. First, a modified carburettor with weak fuel jets, a modified choke, and the idle set to weak adjustment. The first lowers the carbon monoxide emission at cruising speeds, the second during the warming up period and the third has a marked effect on hydrocarbon emission at speeds up to 25 m.p.h.

Secondly, there is a modified distributor, arranged to provide a substantial spark retard when the car is at

idle, resulting in low hydrocarbon formation. It also provides a slightly greater throttle opening at normal idling speeds. When the car accelerates with the throttle remaining partially open, there is more complete burning of the fuel in the cylinders and a reduction in the exhaust emission. This is particularly effective when combined with the advanced timing provided by a special valve.

Thirdly, this special vacuum-operated valve, mounted between the distributor and carburettor, senses the change in manifold vacuum when the car decelerates and there is a flood of fuel to the cylinders which cannot be burned off under normal circumstances. It "instructs" the distributor to provide the maximum spark advance at this time to provide efficient burning and reduce carbon monoxide and hydrocarbon emission.

The General Motors method will be based on an air-injection system, using an engine-driven pump to manifold air through small-diameter tubes, to impinge upon the hot exhaust valves. The air injection at this point, mixing with the hot exhaust gases as they discharge from the engine cylinders, oxidizes any unburned hydrocarbons and carbon monoxide.

The Ford system, called the Thermactor, will use the same principle, and American Motors will use engine modifications and an integrated air injection system.

According to *Chemical Engineering*, New York, one question remaining is the position of the foreign car market in California. Most of these cars are in the under 140 cu. in. engine displacement class, for which no approved device has yet been developed. (The regulations would not

affect small cars until two such devices are available.) Volkswagen, which has a large market in California, is reported to be attempting to develop its own control system. No reference is made to British cars.

Crankcase Control Trouble

The Californian State Legislature has been urged by the State Motor Vehicle Pollution Control Board to strengthen auto smog control law and not to abandon the programme of installing crankcase devices on used cars in the State's metropolitan counties as had been proposed.

The Board declared that in a year's operation of the used car crankcase installation programme certain weaknesses had shown up in the original laws which new measures could correct. For instance, a staff survey reported to the Board that 24 per cent of car owners requiring smog devices did not have them. The survey indicated that another 28 per cent of 911 installations checked were improperly installed.

New Federal Grants for Clean Air

Secretary of Health, Education and Welfare, Anthony J. Celebrezze, has made two further announcements about awards to local, State or regional government agencies to help them initiate or strengthen programmes for the control of air pollution. The grants are made under the Clean Air Act, 1963, which for the first time authorized the Federal Government to provide such funds. The second list of grants is to 16 regional bodies or cities, and totals \$859,752. The third list, to 12 bodies, totals \$536,144.

Measuring SO₂—The U.S. Department of Health, Education and Welfare, Public Health Service, has published a handbook on "Methods of Measuring and Monitoring Atmospheric Sulphur Dioxide". It is described as a literature review of methodology relating to the measurement of atmospheric sulphur dioxide, with a detailed description of recommended methods, and criteria for selection of recommended methods.

The publication is intended to serve as a resource document for those involved in measurement of pollution and in research on new or improved methods, and for those who seek to bring about widespread agreement in matters concerning measurement of pollution.

Malta

CLEAN AIR SOCIETY FORMED

A National Society for Clean Air has been formed in Malta for the purpose of making the Government pass legislation against smoke and smells from ships, cars and other sources of pollution. The Society is also to fight for a good drainage system throughout the Island.

The Secretary, Mr. E. S. Abela, tells us that the first meeting, in November, was well attended and there is much support from the public and from the local press. The new Society has expressed its thanks to ourselves, for the information and assistance we have been able to give them. We extend our good wishes for success to this new N.S.C.A.

U.S.S.R.

MOSCOW CONFERENCE ON A.P.

Air pollution in big Soviet cities—Moscow, Leningrad, Kiev, and Kharkov, for instance—is much less than in the capitals of the United States, Britain, and France, the Soviet hygiene expert, Dr. Pyotr Lyarsky, told a U.S.S.R. conference on air pollution in Moscow.

Describing the measures being taken in the industrial regions of the U.S.S.R. he said that in the Russian federation alone there are 125 special laboratories for research in this field. Similar laboratories exist in the industrial regions of all Union republics.

In recent years several thousand dust and gas absorbers have been installed in Soviet industrial enterprises. The design for new enterprises envisages everything needed to combat dangerous fall-out. Soviet-

designed neutralizers for motor transport are now being tested.

Belgium

CALME ET AIR PUR

We have been interested to receive the official publication of the Belgian National Council against Air Pollution and Noise, published on alternate months in both French and Flemish, and entitled suitably "Calme et Air Pur" (Quiet and Pure Air). The November-December, 1964 issue, contains an article by Dr. H. Maisin on atmospheric pollution and respiratory cancers, with a useful list of references on this subject; a complaint about the insufficiency of public funds in Belgium for fighting atmospheric pollution, various news items relating to clean air at home and abroad, reports, reviews and accounts from conferences.

DISTRICT HEATING— NUCLEAR

A Swedish Experiment

The *Weekend Telegraph* for February 5, 1965, carried an intriguing article by Thomas Harris, on the Stockholm suburb of Farsta, which this winter has become the first township in the world to be heated by direct nuclear heat. "The 30,000 inhabitants living in Farsta's 9,500 flats and maisonettes", says the author, "can also boast of having cleaner air than any other suburb anywhere".

It is to be regarded as something of a pilot project for larger schemes of the future. Hot water is piped from a nuclear reactor two-and-a-half miles from Farsta. The reactor is built in a cavern hollowed out of a granite cliff on the shore of a lake.

"Heat in the plant", writes Mr. Harris, "is first generated by a chain reaction in the reactor. From there the heat is passed to a primary cooling circuit. In this heavy water is introduced to the reactor, heated there to 220°C., expelled, passed through

a heat exchanger, and then reintroduced into the reactor for reheating.

"From this heavy water primary cooling system the heat passes through a second heat-exchanger into the secondary cooling system. This is filled with ordinary cold water which, receiving the intense heat of the heavy water, turns to steam, is passed through a turbine, condensed and returned to the circuit. From the secondary cooling system the heat is passed through a third exchanger and a third cooling system. Then falling just below boiling point, it is piped to Farsta."

Here the pipe-line is connected to a network of hot water pipes running under the street and pavements and linking up all the radiators, kitchen and bathroom taps in the suburb's homes, offices, shops, and other buildings.

The atomic plant cost nearly £14 million and took nearly six years to build. It supplies 55,000 kw. of heat to the town, and also yields 10,000 kw. of electricity from a generator driven by the turbine inserted in the secondary cooling circuit. This is fed directly into the general power network. The consumers are being charged no more for their heat than the normal costs for conventional heat.

"Yet", states the article, "the nuclear heat is several times more expensive than oil heat, according to the owners of the plant, Stockholm Electricity Board, the State Waterfalls Board, and the semi-state Atomic Energy Company. Exactly how much more expensive they are now busily calculating. In the meantime they are happy enough to run the plant at a loss and charge it up to scientific experience, and against the export of reactors which Sweden hopes one day to start in competition with Britain, the United States, France and the Soviet Union."

The article continues by describing the waste disposal problems and the many safety precautions enforced. It concludes with a brief description

of Farsta, and mentions another feature of clean air importance. Although serving primarily as a dormitory town for people working in Stockholm, it is largely self-contained and has its own shopping centre. "It has squares with flowers and trees, fountains and pools, from which all motor traffic is banned. Those who planned it believe that this suburb is the town of the future. . ."

THE HYDRO-PRECIPITROL

Major A. P. de Seversky, well-known for his pioneering inventions and development in aviation and other fields, has developed a new type of gas cleaning equipment for the control of air pollution in incineration. The system consists of a hydrocyclone scrubber for the removal of large particles, followed by a wet electrostatic precipitator for removing small particles down to 0.01 micron. With diameters of 26 in., the scrubber is 5 ft. 6 in., and the precipitator 8 ft. 6 in., in height. Below, there is a

circulating water tank 15 in. high. The appliance can be used built up as a tower, or used in tandem formation.

A laminar flow of gases through the precipitator eliminates turbulence and thus reduces draught and power requirements. A continuous flow of water keeps the collecting electrodes and other internally exposed parts clean. It is activated by the push of a button and an on-off cycle can be determined automatically by a thermal switch or smoke detector. A 99.9 per cent collection of the sub-micron particles is claimed.

Suggested uses include residential incineration pollution control, filtration of radioactive particles, control of smoke, soot and dust on ships at sea, control of dust, pollen, bacteria and viruses in hospitals and industrial "white rooms", and for various industrial purposes.

The appliance is manufactured by Electronatom Corporation, 30 Rockefeller Plaza, New York, N.Y., from whom descriptive literature can be obtained.

Central Heating, Insulation —and the Finns

In a statement from the firm of Housing Development and Construction Ltd., of Stratford-upon-Avon, Mr. H. A. Hicks, the Chairman and Managing Director, discussed their three years of development that went into the design and production of their "industrialized" system of housing. He said:

"To solve many of the problems, they had to be dealt with quite fundamentally. For example on central heating costs, I asked our economist to find me a country with a lower standard living than ours, where they use central heating as a matter of course. He came up with Finland, so I went there with my Chief Engineer and we questioned a wide cross section of people connected with the construction industry."

After a complete survey, they were

surprised to find that the Finns were producing central heating at about half the costs possible in this country and investigations proved that the main reason for this was that the insulation in Finnish houses was of a very high standard. "It made ours look silly" said Mr. Hicks. "Three inches of glass wool was being used in their houses, against three-quarters of an inch in British houses, and many British houses carry no insulation at all."

Development of the H.D.C. house then proceeded to Finnish standards of insulation. "Everybody said that we were quite mad, but we went ahead" said Mr. Hicks. "We can centrally heat houses for 14s. 6d. per week, when exactly the same house, traditionally built with 11 inch cavity walls, would cost 30s. 0d. per week to heat. The figure of 14s. 6d., which is on the gas tariff of the West Midlands Gas Board, has been carefully

calculated, tested, proved and is quite factual."

The U value of an 11 inch cavity wall is 0.30 Btu. *i.e.* every square foot of a brick cavity wall loses 0.3 of a Btu. On H.D.C. house walls the heat loss is only 0.12 of a Btu. (40 per cent of the heat loss of an 11 inch cavity wall). The same facts apply to the roofs. The heat loss on H.D.C. roofs is less than one third of the heat loss on normal roofs due to the method of construction employed and the high degree of insulation supplied and fitted in the factory built units as standard.

In H.D.C. industrialized houses the desired temperature level can be

attained in half the time required in conventionally built houses under normal conditions.

System built homes can have any form of central heating specified for them but so that the maximum amount of installation can be carried out in the factory it has been found that a ducted warm air system is the most efficient and convenient. Similarly, the company says, any fuel can be used as the heating source and local authorities are free to specify what heating fuel they require, but for reasons of economy, trouble-free operation and control and installation ease, gas has been chosen for the first H.D.C. houses to be erected.

Personal

The new Chief Alkali Inspector, in succession to Dr. J. S. Carter, is **Mr. F. E. Ireland**. Born in Widnes, Lancashire, in 1913, he graduated in chemistry at the University of Liverpool, and after posts in the chemical industry joined the Civil Service in 1953 as an Alkali Inspector based on Sheffield. He was promoted to Deputy Chief Alkali Inspector in 1958.

To mark the retirement of **Mr. F. W. Perry** as Chairman of the Midlands Joint Advisory Clean Air Council, a fitted travelling case was presented to him by that organization on December 8, 1964. The presentation took place at his home and was made by Dr. W. R. Martine (a former hon. secretary, accompanied by Mr. W. L. Kay and Mr. H. E. T. Lowbridge.

Mr. Perry, who was elected to Smethwick Borough Council in 1925, attended as a delegate from that Council the conference at Buxton in 1929 when the National Smoke Abatement Society was formed. He has been an ardent and sincere worker for clean air ever since a visit to Smethwick in the 1920's of the late Dr. De Vœux. Now aged 86 and in good health, Mr. Perry resigned

in 1964 as Chairman of the Advisory Council and from the Smethwick Council. He had been an alderman and Mayor, and was granted the Freedom of the Borough in 1950.

Mr. J. I. Bernard, B.Sc. Tech (Hons), M.I.E.E., M.I.H.V.E., retired on December 31, last from his post as Director and Secretary of the Electrical Development Association. He had represented the Association on the Executive Council of the N.S.C.A. for a number of years. He joined E.D.A. in 1927 as its first technical officer and was appointed to his late position in 1957.

Mr. Bernard is succeeded as Director and Secretary by **Mr. Robert Hanilton Phillips**, until recently a Director of the General Electric Co., Central Unit. He has spent a lifetime in the electrical industry.


After 48 years' service with British Railways, **Mr. G. H. Hulme**, of Alpertons, has retired. He started his career as an engine cleaner in Manchester, became a fireman and driver, and in 1958 was appointed Smoke Inspector in London for B.R., based at St. Pancras. Mr. Hulme is an individual member of the N.S.C.A.

NEW WALL CHART FOR SCHOOLS

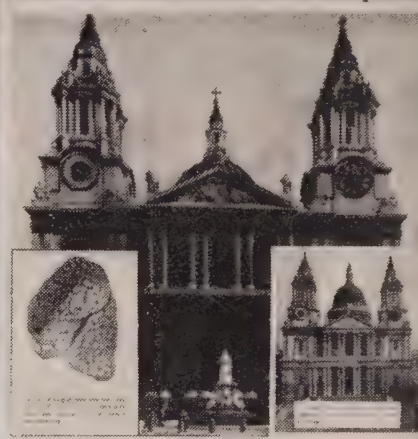
In conjunction with Educational Productions Ltd., the Society has produced the Clean Air Wall Chart illustrated. It is in four colours and is 44 by 25 ins. in size. We hope that readers may be able to draw the chart to the attention of educational authorities and schools. The chart is *not* being distributed by the Society, but by Educational Productions Ltd., East Ardsley, Wakefield, Yorks, to whom inquiries should be made. Included with each chart is a 12 page booklet of Notes on Clean Air for Teachers and Lecturers. A small distribution charge of 2s. is made for chart and booklet. The booklet may also be obtained direct from the Society separately, price 1s. 6d., post-free.

CLEAN AIR

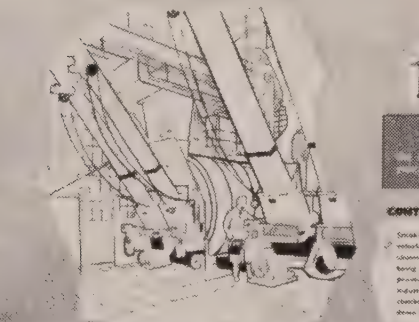
The air in towns is constantly being polluted with smoke, acids, grit, dust and fumes. These are injurious to health, cause dirt and corrosion and cost the nation vast sums of money each year.




When the air is clean, children can play outdoors and breathe the fresh air. But when the air is polluted with smoke and fumes, they are forced to stay indoors and breathe the dirty air. This is bad for their health.



The air in towns is constantly being polluted with smoke, acids, grit, dust and fumes. These are injurious to health, cause dirt and corrosion and cost the nation vast sums of money each year.




The smoke from these chimneys pollutes the air and makes it dirty.



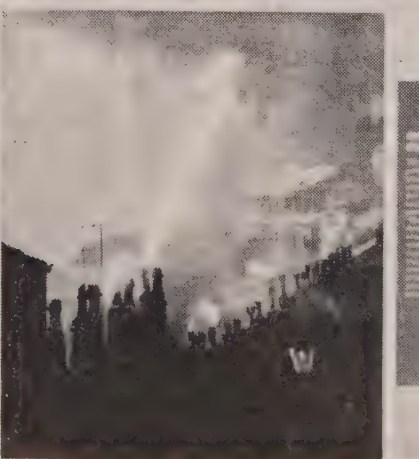
TRUCKS

CONTROL BY LEGISLATION


Smoking, factory chimneys and motor vehicles are some of the major causes of air pollution which are now being controlled by legislation. Improved methods of combustion in industry and Ministry of Transport checks on vehicles are helping to reduce pollution.




Smoking the fumes of a motor car.



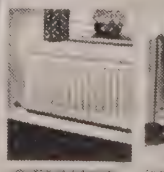
The smoke from these chimneys pollutes the air and makes it dirty.



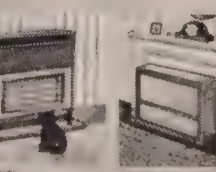
1970s computer monitor.



1970s television set.



1970s radio.



1970s record player.

Northern Ireland and Clean Air

BELFAST CONFERENCE AND EXHIBITION

FOR the first time in Northern Ireland, a successful one-day Clean Air Conference was organized in Belfast on November 26, 1964 by the Northern Ireland Division of the Society, while a Clean Air and Home Heating Exhibition took place during that whole week. The Conference was well attended by representatives of local authorities and other public bodies, public health officials and industrialists. It was opened by The Minister of Health and Social Services, the Rt. Hon. William Morgan who was welcomed by the Society's President, Dr. Albert Parker, and the full programme included the presentation of eight papers on different aspects of clean air.

Dr. James McA. Taggart, the Medical Officer of Health for Belfast, in his paper "Why Clean Air?" reviewing health education from biblical times, declared air pollution to be among the most important remaining enemies and wished that our ancestors had not left us such a legacy of inefficient smoke emitting appliances both in the factory and in the home. He described the nature of air pollution and its effects on health which could be considered as those affecting a person's lungs, his heart and his psychological state. Greater even than the dangers to health, damage to plant life, destruction of buildings and the added risks of travel was the great economic loss which the nation suffered annually as a result of smoke. Ulster was fortunate now in having its own Clean Air Act—in several respects an improvement on Britain's,—but Dr. Taggart cautioned that it would not be effective unless local authorities secured the co-operation of the public.

"Domestic Heating Appliances in a Smoke Control Area" by Mr. F. R.

McBride, gave a résumé of the various heating methods available to householders in Northern Ireland and listed the main kinds of appliances using electricity, gas oil and smokeless solid fuels. Among the points mentioned by Mr. McBride were: the new range of electric turbo-blowers which could also be used as stereophonic speakers, transistor radios or ventilators; that the Belfast Corporation Gas Department would be producing in future gas free of impurities as a result of proposed blending processes; the building of the new oil refinery on the outskirts of Belfast; the growing popularity in Ulster of improved solid fuel room heaters. In conclusion, Mr. McBride appealed to architects and builders for more thought and attention being given to chimney building, since complaints regarding the operation of all sorts of appliances were most frequently traced to faulty chimney design or construction.

Regarding fuel prospects in Northern Ireland, four papers were given on the future supply position by four representatives of the various industries.

Solid Smokeless Fuels

Confining his observations to domestic requirements for solid fuel, Mr. B. Chad Smith of the National Coal Board said that although the local authorities' plans for introducing smoke control orders were not known yet, already about 30 per cent of the solid smokeless fuels used in Northern Ireland were brought from the mainland and additional supplies would have to be shipped to meet future clean air requirements. Referring to the extending of Exchequer grants in Britain for more sophisticated solid fuel appliances, Mr. Smith hoped that the Government in Northern Ireland

would follow suit, as a means of offsetting the higher transport costs by greater efficiency and economy of these fuels. After assuring the conference that the future supply prospects of solid smokeless fuels were better than envisaged in the White Paper, he described the new fuels being produced by the National Coal Board and their efforts in developing a wider range of smokeless appliances.

Electricity

Because of the need in Northern Ireland to attract new industries, said Mr. J. F. Corcoran, the electricity supply industry there has not been subject to any limitation, and consequently had never suffered from load shedding or supply failures. Referring to future plans for new power stations, Mr. Corcoran said that nuclear generation was of particular interest in an area like Northern Ireland which had to import high cost fuel. He felt personally that they would have a nuclear station in the 1970's. After describing the wide variety of types of electric heating equipment available, Mr. Corcoran suggested the best overall buy for a consumer using most suitable forms of electricity in different rooms of the house. He emphasized that the policy of the Electricity Supply Authorities in Northern Ireland was to continue to encourage the development of the off-peak heating loads and that in future the electricity costs would increase at a much slower rate than the costs of most other services and commodities.

Gas

Mr. James M. Dow (Belfast Corporation Gas Department) said that although gas came to Ulster as far back as 1823, the industry was now looking to new horizons where cheaper gas could be produced by using petroleum feedstock as a substitute for coal. The new methods however, would stop all coke production in the Province and practically all supplies of solid smokeless fuel would have to be imported. Since the traditional

methods of gas production were quite uneconomic, Mr. Dow was strongly of the opinion that the best contribution the gas industry in Ulster could make towards meeting the requirements of the Clean Air Act, was to produce a non-toxic, non-sulphurous gas at a price highly competitive with the other fuels. Just as gas for domestic purposes had come back to Britain in a big way since their Clean Air Act, so Ulster too, should prepare itself to meet a great increase in demand immediately their Act became effective. It was vitally necessary however, that a gas supply should be made available in all new houses in the Province which was not the case at present.

Oil

Mr. J. P. MacCarthy (Shell-Mex and B.P. Ltd), spoke of the essential role of oil in securing clean air and emphasized the international character of the oil supplying industry as well as its world-wide availability. In Northern Ireland, a new refinery costing about £7 million had recently been opened. Whereas in the initial period of clean air administration in Britain a grant was normally payable only on the cost of converting to an improved open grate, there would be from the beginning a wide range of choice in Northern Ireland—including oil heaters. After outlining the distribution arrangements, and describing the various types of oil burning equipment and appliances, Mr. MacCarthy concluded that the oil industry would have no difficulty whatsoever in making its contribution to clean air in Northern Ireland.

Smoke control in Leeds

Mr. James Goodfellow gave a detailed paper on the progress of smoke control in Leeds where they had been working towards this end for more than 25 years. During the last ten years there had been a remarkable improvement in the city centre's atmosphere, the average smoke level being reduced by 60 per cent and average sulphur dioxide level dropping

25 per cent. About one-sixth of the domestic premises were now under smoke control and householders in Leeds were pressing for orders to be made at a faster rate than was possible. They fully appreciated the benefits of clean air and accepted the slight disturbance and change of fuel, paying willingly their share of adaptation costs. Mr. Goodfellow praised the enlightened attitude of the local press which played an important part in the development of informed public opinion. Nevertheless, ignorance, lethargy, false superstition and the desire to have no change, were still enemies. The successful administration of the Clean Air Act could only be obtained, said Mr. Goodfellow, if properly informed public opinion was maintained by the combined continuous activities of local authorities, local officials, the Press and the Divisional Council of the National Society for Clean Air.

"Air—for Burning and for Breathing" was the title of a paper presented by Mr. H. Brown, Area Manager of Belfast N.I.F.E.S. and showed the

importance of air not only to the individual to support life but to the industrialist to support combustion. Mr. Brown discussed various methods of combustion in industry, the sources of smoke emission, economics of clean air, ways to operate plants efficiently and outlined the services that were available to Northern Ireland industrialists. He concluded that for the latter a new maxim should be propagated: "Look after the air and the fuel will look after itself".

Successful Exhibition

Northern Ireland's first Clean Air and Home Heating Exhibition was held from November 24 to 27, 1964 and was considered by the exhibitors to have been very successful. Much of the detailed work in staging this exhibition was done by Mr. W. E. C. O'Brien, the Division's Honorary Secretary, assisted by members of the Down County Health Department. The exhibition was opened by the Lord Mayor of Belfast and toured by the Rt. Hon. William Morgan.



At the Belfast Exhibition—left to right: The Lord Mayor of Belfast, Councillor William Jenkins, Mr. W. E. C. O'Brien, Hon. Secretary, Mr. R. Campbell Brown, Divisional Vice-Chairman, and Councillor Miss I. M. E. McAlery, J.P., Divisional Chairman

DOMESTIC SMOKE AT ITS WORST

By "Young Observer"

During the past twelve years the pattern of atmospheric pollution in Great Britain has changed. Whereas the central areas of our large cities used to be the smokiest places, it is now certain suburbs, smaller towns and villages which so far have refused smoke control that are most heavily polluted. That cleaner air must come in most British cities, few would deny, but the Clean Air Act has been most visually effective there in its early years.

It is perhaps in the old mining villages where least progress has been made. Take the typical County Durham village street scene of heaped coal on pavements; much of it unwashed and containing stones. Miners have had this free coal since the beginning of the century. It is counted as part of their wage and is a right they jealously guard, even to the extent of refusing to have it delivered in bags in certain areas. Most miners receive on average between 12 and 20 concessionary tons a year, according to the size of their family. This is between six and eight times the quantity that people in the North were able to obtain when coal was rationed during and after the 1939-45 war. However, they do not all receive as much as this. Through local arrangements they can agree to give some to retired miners and pensioners, who receive through the generosity of the miners an average of four-and-a-half tons a year.

These large quantities of coal are still burned mainly on very old-fashioned large open grates with huge chimney breasts and adjacent ovens for cooking. Since in these villages the houses are packed close together and huge fires are traditional both in summer and winter, if the village is a large one the soot fall-out is very heavy indeed. Nowadays it is visibly more than in most of our city

centres. A perpetual air of drabness and decay is created by this state of affairs. Housewives with a standard have never finished cleaning. Rates of chronic bronchitis and lung cancer are high. Chimneys are frequently set on fire to clean them and no-one even thinks of any fine being imposed for the offence.

In one Durham village the cleaning and pointing of the interior of the Parish Church provides a first-class illustration of the evil of domestic smoke. This Church was last cleaned in 1932 and is only 52 years old, but the workmen who cleaned it in 1964 thought it hadn't been touched for 150 years! Huge slabs of soot and dust, $\frac{1}{4}$ inch thick, fell from the interior of the Church tower. It was so bad that the men said they would not have accepted the work if they had known its condition beforehand. The cost was £800. This large Church stands in the centre of a thick concentration of colliery houses.

Here is seen domestic smoke at its worst. There is no doubt that concessionary coal is to blame for the ruinous measure of it. The pollution in a non-mining village is negligible by comparison.

From August 1965 all concessionary coal has to be bagged. Under a by-law which comes into force then, a fine of £5 can be imposed for coal tipped on the highway or £2 a day as long as it is left there. This means that miners will receive less coal by weight than hitherto; 7 tons 6 cwt. each per year. Since it will after then all be washed, however, they will not lose any through piles of unburnable stones in every load. Their donation to retired miners and pensioners will continue, but this will be reduced to three tons a year.

It looks as if the firm habit of open coal fires in mining areas is to remain unchanged for many years to come.

Any proposal for smokeless and more efficient ways of heating meets with rock-like opposition. The issue is a highly emotional one and there is need for reason and education to overcome it. Assuming the majority can be persuaded, what is the best way to achieve clean air in our mining villages?

In the more permanent mining villages, district heating schemes should be implemented, where this con-

cessionary coal is burned smokelessly in a large central plant, the miners thus receiving free central heating in their homes. For areas where pits are likely to close more temporary measures should be encouraged, with incentives to the miners to heat their homes by smokeless fuel, gas or electricity. The Clean Air programme must not be sabotaged through ignorance and stonewall resistance to change.

Correspondence

SULPHUR DIOXIDE

*The Editor
Smokeless Air*

Sir:

In your Winter Number you say that the only criticism heard of the Technical Committee's report on sulphur dioxide was during discussion at the Harrogate Conference. I would like to add to this and to comment on a surprising omission in the report—any consideration of the siting of power stations burning sulphur-containing fuel. I find it difficult to understand how this problem was not considered, particularly when the report points out that by 1970 about 45 per cent of the output of our coal fields will be burnt in power stations which will discharge $2\frac{3}{4}$ million tons of sulphur dioxide into the atmosphere annually. Perhaps the Committee considered that the final word on this had already been said by the Medical Assessor in the Ratcliffe Inquiry Report (quoted on page 117 of the same number) that "I am of the opinion that the power station emissions would not add any appreciable hazard to the health of the surrounding population".

I believe it is true to say that the majority of medical opinion in this country is strongly of the opinion that the average levels of pollution in our towns, especially in winter,

are major factors in the development of chronic bronchitis (leaving out any consideration of the *coup de grâce* from smogs). The difference in morbidity between summer and winter months is striking and everyone knows how much bronchitics improve in the summer, especially if they leave industrial towns for a holiday at the seaside. Though by no means the only factor that needs to be considered in looking for the cause of this difference, it would be foolish to disregard the difference in average sulphur dioxide levels at these times—for example, 11 parts per 100 million in the City of London in summer and 17 pphm in winter. In our present state of knowledge the only safe view, in the interests of public health, is to regard variations of this order over years of exposure as of great importance.

We still do not know what sulphur dioxide concentrations at ground level the new 2,000 megawatt stations will produce, but even with 650 feet chimneys, estimates of the order of 3 pphm have been put forward by the Central Electricity Generating Board. This average will be in addition to the existing background levels and will affect a wide area (estimated short term levels of up to 45 pphm in more localized areas are left out of this discussion). If we are to judge by the experience in London, implemen-

tation of the Clean Air Act will not in itself bring about a fall in ground level concentrations of sulphur dioxide now existing in our towns and cities, because of our mounting demands for heat.

If the statements I have made above are reasonable—and I believe they are—then to introduce installations into thickly populated areas that will expose hundreds of thousands of people to increases in sulphur dioxide levels that at first sight seem modest, is foolish. When it is not even necessary except on the basis of somewhat marginal economy, it is disturbing. Yet this is what the Generating Board, with the support of the Ministry of Health, is doing with at least two of its new power stations (Ratcliffe-on-Trent and Fiddler's Ferry). Though suitable sites with good access to water, coal and transport are not unlimited, there seems to be no good evidence that enough of these cannot still be found at a distance of ten or more miles from large centres of population.

Whilst it is accepted that much smaller installations may produce as high or even higher ground level concentrations of sulphur dioxide, the essential difference is that these are more localized and affect a very much smaller number of people. With many (for example, heating for office blocks and flats) there is no possibility of siting them away from populated areas.

Our great need is for a lowering in pollution levels in our towns and cities and not for an increase in any fraction. With different principles in siting, large power stations could do so much more to achieve this.

From this it will be clear that I do not share the Medical Assessor's complacency. I would like to suggest that the Technical Committee should turn its critical faculties to this problem.

Yours faithfully,

D. DAVIES, M.D., M.R.C.P.

*Ransom Hospital,
Rainworth, Notts.*

WILL HIGHER CHIMNEYS REALLY HELP?

*The Editor
Smokeless Air*

Sir,

In two of the papers presented to the Harrogate Conference higher chimneys were advocated as a means of decreasing pollution at the surface, but such chimneys are unsightly and in many instances aesthetically unacceptable. While I have no objection to an apparently "unreasonable" policy if it can be shown to be of real benefit in the long run I do not consider this to be the case with higher chimneys (except for power stations with their extremely high ones). Statistically it can be shown that increasing the effective height of chimneys does in fact decrease the average pollution at the surface, but herein lies the fallacy. The statistical argument will only lead to conclusions about average conditions, whereas we should continually apply the "maximum credible accident" approach.

Consider a flat town subject to low-level inversions and use the last column of Table 1 in the Sulphur Dioxide Report (page 6) as simple units of pollution per 24 hrs. Below an inversion the pollution on the lee side of the town will be distributed fairly evenly in the vertical plane due to continual convective mixing above chimneys. Thus after 24 hrs. with an inversion at 1,000 ft. there will be 6.37 units total pollution, with 0.32 units in each 50 ft. But inversions can, and do, occur at any height. Consider new inversions below about 150 ft. and thus exclude power stations and 10 per cent of industrial chimneys. (For effective height of existing industrial chimneys I have made a guess of 10 per cent below 50 ft., 30 per cent 50 to 100 ft., 30 per cent 100 to 150 ft. and 10 per cent above.) The total pollution from domestic and transport sources is 1.19 units and from industrial sources 2.83 (3.14 less 10 per cent). With an inversion at 50 ft. the pollution will be 1.47 units: with one at 100 ft. it will be 2.31,

or 1.15 units per 50 ft: with one at 150 ft. it will be 1.15 per 50 ft. The maximum credible accident (MCA) is therefore 1.47 units per 50 ft. If by some miraculous intervention we could add 50 ft. to the effective height of all existing industrial chimneys the figures would be: inversion at 50 ft. 1.19, at 100 ft. 0.73, at 150 ft. 0.77 and at 200 ft. 0.79 units per 50 ft. The MCA is therefore reduced to 1.19 from 1.47, or a reduction of less than 20 per cent.

The arithmetic is complicated, but in plain terms it means that if a fatal accumulation of sulphur dioxide can now occur in a town in $2\frac{1}{2}$ days our miraculous intervention will postpone the deaths by about 12 hours. It is purely a pipe-dream to expect to achieve even 1 per cent of this pitifully meagre improvement. By comparison, if we could eliminate sulphur dioxide from transport sources and halve domestic pollution (and now we are out of the realm of pipe-dreams) the fatal accumulation would be postponed by two whole days.

In an isolated instance or two a higher chimney may be the only conceivable answer, but in the majority of cases aesthetic and other town-planning considerations should be allowed to prevail, and the Society should concentrate its efforts on insisting on the elimination of all forms of air pollution at source. In general, improvements in dispersion may be reasonable temporary expedients, but they are no substitute for clean air. In particular, higher chimneys are neither temporary, nor, in my view, expedient.

Yours faithfully,

ERNEST C. PEPPERDINE
Councillor

Welton R.D.C.

SECTION 16

*The Editor
Smokeless Air*

Sir,

I was interested to read your editorial comment headed "Section

Sixteen" in the Winter issue of SMOKELESS AIR.

As I read it I particularly wondered why no mention was made of an article in your own journal of Summer 1963 on page 324. The article immediately interested me in view of our problems as more and more of the town becomes Smoke Controlled. As a new West Riding County Council (General Powers) Bill was on the stocks at this time I suggested to my Council that they ask the County Council to include similar provisions to those included in the Middlesex Act in the West Riding Bill and this they did. I also brought the same matter to the notice of the West Riding Clean Air Advisory Council Executive Committee of which I am a member to do likewise and this they also did.

The result is that the Bill has now become law as the West Riding County Council (General Powers) Act, 1964 and powers are available in Section 27 to Local Authorities in the West Riding administrative area to deal with industrial dark smoke other than from chimneys without the necessity for nuisance to the inhabitants of the neighbourhood to be proved. This power should be very useful in Smoke Control Areas where dark smoke from industrial sources other than chimneys (which are, of course, covered) is undesirable whether it is a nuisance to nearby inhabitants or not.

Presumably other County Councils and County Boroughs will now seek similar powers and eventually following normal public health legislation practice the Section will, if successful, be eventually included in any revision of the Clean Air Act.

Possibly you are already aware of these improvements but as they are not mentioned in your editorial I felt I should write.

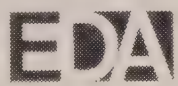
Yours faithfully,

W. JENNINGS

Chief Public Health Inspector

Borough of Brighouse

The Act is reported on page 193—Ed.



MODERN
ELECTRIC
HEATING
IN MULTI-
STOREY
BUILDINGS

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A unique summary of the latest ideas . . . with facts and figures (systems, loads, costs) on many recent installations . . . fully illustrated with photographs, diagrams, charts . . . free from your Electricity Board, or the Electrical Development Association (M/SA/D), Trafalgar Buildings, 1 Charing Cross, London, SW1.

Published by the
Electrical Development Association

SMOKE CONTROL AREAS

Progress Report

POSITION TO JANUARY 1, 1965—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,535	48
<i>Acres</i>	341,883	15,342
<i>Premises</i>	1,887,555	111,540
Smoke Control Orders		
Confirmed	134	6
Submitted	109	11
Grand Totals	1,822	66

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Winter, 1964), which gave the position up to October 1, 1964. They now show the changes and additions to January 1, 1965.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control Areas in Operation

Tyneside and Wearside

Whickham U.D.¹ Nos. 2 and 3.

West Riding (North)

Aireborough U.D. No. 15, Bingley U.D. No. 10, Castleford B. No. 1, Ossett B. No. 9, Shipley U.D. Nos. 4 and 5.

West Riding (South)

Sheffield C. B. Nos. 11.

Derby, Nottingham and Chesterfield
Derby C.B. No. 5.

North Midlands

Leicester C.B. No. 13.

County of London

Hackney M.B. No. 8, Hammersmith M.B. No. 6, Islington M.B. Nos. 13 and 14, Southwark M.B. No. 3.

Outer London

Acton B. No. 9, Barking B. Nos. 6 to 8, Barnes B. No. 5, Chingford B. No. 4, Dagenham B. No. 6, Ealing B. No. 17, Friern Barnet U.D. No. 5, Harrow B. No. 8, Hornsey B. No. 6, Mitcham B. No. 2, Wembley B. No. 9, Willesden B. No. 6.

South Lancashire and North-East Cheshire
Bury C.B. No. 4.

Merseyside

Birkenhead C.B. No. 3.

West Midlands

*Birmingham C.B. No. 34, Birmingham C.B. Nos. 103 to 106, Halesowen B. No. 23.

Local Authorities outside the Black Areas

*Bedford B. Nos. 2 and 3, Harlow U.D. No. 4, Todmorden B. No. 3, Yiewsley & West Drayton U.D. Nos. 6 and 7.

New Orders Confirmed but not yet in Operation

Tyneside and Wearside

Gateshead C.B. No. 6, Newcastle-upon-Tyne C.B. No. 12.

West Riding (North)

Brighouse B. No. 9, Halifax C.B. Nos. 9 and 10, Horsforth U.D. No. 21, Leeds C.B. Nos. 42 to 45, 47 and 48, Mirfield U.D. No. 6, Morley B. No. 28.

West Riding (South)

Sheffield C.B. No. 16.

Derby, Nottingham and Chesterfield

Derby C.B. No. 6.

County of London

Camberwell M.B. No. 6, Chelsea M.B. No. 3, Finsbury M.B. No. 5, Kensington M.B. No. 8, Paddington M.B. No. 6, St. Marylebone M.B. No. 8, St. Pancras M.B. No. 6, Wandsworth M.B. No. 7, Woolwich M.B. Nos. 20 and 21.

Outer London

Beddington & Wallington B. No. 5, Chislehurst & Sidcup U.D. No. 2, Edmonton B. No. 7, Hendon B. No. 12, Heston & Isleworth B. No. 9, Mitcham B. No. 3, Wanstead & Woodford B. No. 6, Wembley B. Nos. 10 and 11.

South Lancashire and North-East Cheshire

Denton U.D. No. 7, Eccles B. No. 6, Sale B. No. 5, Stalybridge B. Nos. 7 and 8.

Central Lancashire

*Preston C.B. No. 9.

West Midlands

Birmingham C.B. Nos. 107 to 111, Brierley Hill U.D. Nos. 16 to 19.

Potteries

Kidsgrove U.D. Nos. 8 and 9.

Local Authorities outside the Black Areas

Barnet U.D. No. 6, Basildon U.D. No. 3, Chatham B. No. 7, Oxford C.B. No. 4, *Skipton U.D. No. 2.

New Orders Submitted for Confirmation but not yet Confirmed

Tyneside and Wearside

Gateshead C.B. No. 7, Newburn U.D. No. 3, Wallsend C.B. No. 3.

Teeside

Middlesbrough C.B. No. 4, Thornaby-on-Tees B. No. 2.

West Riding (North)

Baildon U.D. Nos. 2 and 3, Brighouse B. No. 10, Halifax C.B. No. 11, Leeds C.B. No. 49, Sowerby Bridge U.D. No. 2.

West Riding (South)

Sheffield C.B. No. 17.

Derby, Nottingham and Chesterfield

Beeston & Stapleford U.D. Nos. 6 and 7, Chesterfield R.D. No. 5.

North Midlands

Leicester C.B. Nos. 14 and 15.

County of London

Lewisham M.B. Nos. 18 and 19, Southwark M.B. No. 4, Stepney M.B. No. 6.

Outer London

Beckenham B. No. 3, Dagenham B. No. 7, Dartford B. Nos. 7 and 8, Ealing B. Nos. 19 and 20, East Barnet U.D. No. 6, Hayes & Harlington U.D. No. 24, Hendon B. No. 13, Ilford B. No. 7, Sutton & Cheam B. No. 3, Twickenham B. No. 4.

South Lancashire and North-East Cheshire

Failsworth U.D. No. 4, Feltham U.D. No. 5, Heywood B. No. 5, Kearsley U.D. No. 1, Manchester C.B. No. 11, Stretford B. No. 7, Swinton & Pendlebury B. No. 4.

Central Lancashire

Preston C.B. No. 10.

Merseyside

Birkenhead C.B. Nos. 4 and 5, Liverpool C.B. No. 18, Warrington C.B. No. 7.

West Midlands

Coventry C.B. No. 7, Sutton Coldfield B. No. 4.

Local Authorities outside the Black Areas

Exeter C.B. Nos. 8 and 9, Harlow U.D. No. 5, Hemel Hempstead B. No. 5, Luton C.B. No. 3.

SCOTLAND

New Smoke Control Areas in Operation

Clydebank No. 4. (Faifley etc.), Falkirk No. 3. (second part)

New Smoke Control Orders Confirmed but not yet in Operation

Renfrew Burgh No. 1.

New Smoke Control Orders Submitted but not yet Confirmed

East Kilbride (Murray; St. Leonards), Falkirk No. 4.

The ninth Sales and Service Conference of the Gas Council, which will be attended by several hundred delegates from the Gas Industry, will be held at Harrogate on November 9 and 10 next.

Summary of Smoke Control Progress
As at December 31, 1964

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern ..	15,115	12.1	69,205	12.5
East and West Ridings ..	77,130	20.5	287,095	24.6
North Midlands	18,355	6.8	68,765	13.4
Greater London	125,350	38.3	1,156,120	43.8
North Western† ..	85,095	21.2	378,545	22.2
Midlands ..	36,860	14.8	176,175	16.8
South Western ..	5,050	19.2	18,105	12.2
Wales and Monmouthshire ..	45	0.01	650	0.2
Totals ..	363,000	17.3	2,154,660	26.3

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (*e.g.* there may be some areas of open country).

† Whitefield Urban District Council Nos. 5 and 6 Orders for re-submission later.
Prestwich Borough No. 7 Order for re-submission later.

ELECTRIC WARM AIR HEATING

The higher standards of comfort required in commercial, industrial and domestic premises offer tremendous scope for electric space heating. A co-ordinated approach is required by the electrical industry to meet the growing demand for direct and thermal storage electric heating systems.

Mr. Harold E. Smith, Assoc. I.E.E., of the Electrical Development Association, said this at the E.D.A. Annual Conference at Harrogate on February 18. He was presenting a paper on "Electric Thermal Storage Warm Air Heating" to 500 Electricity Boards' delegates.

There has been a remarkable increase in the use of warm air for

central heating, particularly in the domestic market, said Mr. Smith. Existing methods of electric thermal storage warm air heating were competitive with other fuels both as regards capital and operating costs. In addition, electric methods eliminated the costly provision and maintenance of flues.

Warm air central heating was becoming increasingly popular in Great Britain. Its advantages included low capital costs; elimination of a boiler house; no space required for pipes, radiators, etc., a flush wall or floor mounted grille could be adjusted to give directional flow of warm air, and the heating unit could be sited in a cupboard or under the stairs;

wide range of control, quick response and flexibility; ease of individual control giving economy in operation; circulation of warm filtered air providing clean conditions; and safety in operation.

Mr. Smith said that electric thermal storage warm air units used at Banff, Bristol, East Kilbride, Preston, Rochdale, Sheffield and elsewhere had a loading of about 9 kW. and a storage capacity of approximately 45 kWh. Capital costs of these early installations had been around £150 installed, but the figure would undoubtedly be reduced for future installations in larger quantities to about £120. This would probably be cheaper than equivalent combustible fuel warm air units because no flue costs would be necessary.

Running costs which were at the cheap off-peak rates, for a well insulated three-apartment four-person dwelling, would be around 13s. to 14s. per week. This would mean an overall cost for *all purposes* for an all-electric dwelling of this size of little more than £1 per week, spread over 52 weeks.

Industrialized Building

In a paper on this subject Mr. R. B. Partington, Assoc. I.E.E., said that during the past ten years new houses have been built at the rate of approximately 300,000 a year and it has been estimated that the demand will steadily increase until by 1984 we will need 390,000 new homes annually.

Within the building industry it was now recognized that increased productivity could not be achieved with existing resources and the present size of the skilled labour force unless its output could be increased by making use of new and more productive methods. Some 15-20 per cent of dwellings were now being built by the faster, better industrialized systems and the percentage was expected to rise as the programme gained in momentum.

"Industrialized methods of building are a most logical development of the

use of factory-made components and small units which for many years have been incorporated in buildings of traditional construction", said Mr. Partington. "Hospitals, schools, factories, power stations and administrative and recreational buildings as well as houses and flats can be erected by the industrialized method. As these small components have become familiar and are widely used in the industry, there seems little reason why larger and more important elements that are industrially produced in quantity should not also be readily acceptable; this is, in effect, what is already taking place."



New Flued Oil Convactor Heater

The "Sunstream" is a new flued light-oil fired convactor heater with an output of 14,000 Btu's per hour. Marketed by Chinook Heaters Ltd., of Wimbledon, the "Sunstream" fits into the fireplace in the space left after the old grate has been removed. The only fitting required is a back-plate, through which the flue passes. Operating on paraffin, the running costs of this heater is approximately 2s. 5d. per hour, consuming from $\frac{1}{3}$ to 1 pint of oil per hour according to setting. The cash price is £35, including purchase tax.

SOUTH-EAST DISCUSSION ON CHIMNEY HEIGHTS

Over 150 members and representatives attended a meeting on "Chimney Heights" called by the Division in the Library of the Royal Society of Health on Wednesday, February 3. The Chairman of the Division, Mr. W. Combey, in his introductory remarks, explained that the meeting had been arranged by the Division in an effort to satisfy the feeling of members that more information was required. He thought that the two speakers, Dr. S. R. Craxford of Warren Spring Laboratory and Mr. William Barnes, F.R.I.B.A., Letchworth, would, between them, clarify seemingly conflicting viewpoints and at the same time satisfy the demand for more information.

Dr. Craxford said that many people, among whom he was included, had little faith in the older calculations of the dispersion of chimney plumes because they were based on considerations of a steady plume in a steady wind dispersing evenly along a cone and this picture seemed completely irrelevant to the actual behaviour of any chimney plume that anyone has ever seen. Nobody could really be surprised when the formulae of each different theory gave different results. In the last few years however, the mathematicians and the practical men seem to be approaching common ground by devoting their attention to the envelope within which the plume waves about over say the course of an hour. This envelope can be measured experimentally by releasing zero-lift balloons into the chimney gases and observing their movements and in this way the dispersion of the gases and the thermal rise of the plume

can be measured and compared with the theory of such envelopes.

Dr. Craxford then went on to discuss the present position with regard to chimney heights. He said that although no specific heights were laid down by law for works of a specific size and although no maximum allowable concentrations at ground level had been laid down, a great deal of information on the official attitude to these matters could be obtained from the inspectors' reports of the Public Inquiries held whenever a new power station is projected. One recent such Inquiry concerned the proposed power station at Ratcliffe-on-Soar. This was to be a 2000 megawatt station with the chimney 650 ft. high burning coal with one per cent of sulphur and emitting about 100,000 tons of sulphur dioxide a year. The gases would be emitted at about 100°C and at a velocity of 75 ft./sec. C.E.G.B. submitted that with such a power station and for an average wind speed of about 13 miles/hour the maximum concentration of sulphur dioxide at ground level would be about 450 microgrammes per cubic metre to within a factor of two either way. This was a short period—three minutes—concentration and the long narrow elliptical area in which this maximum concentration would occur would move about rapidly from one place to another according to the constantly occurring small changes in wind direction and velocity. The long term average concentration was less than this figure by a factor of about 30. C.E.G.B. submitted evidence of practical measurements made in the neigh-

bourhood of their power station at Castle Donington and High Marnham and found that where the same method of calculation gave 1,000 and 800 $\mu\text{g}/\text{m}^3$ respectively, the highest concentration detected was in both instances 1,250 $\mu\text{g}/\text{m}^3$. The inspector of the Ministry of Power reported that the objectors were unable to shake the validity of C.E.G.B. calculations supported by the Castle Donington and High Marnham measurements.

It would appear therefore that short term concentrations of the order of 450 $\mu\text{g}/\text{m}^3$ was acceptable and this opinion was confirmed by making calculations from the suggested chimney heights for smaller installations given in the Ministry of Housing and Local Government Memorandum; the concentrations so obtained came out at 450 $\mu\text{g}/\text{m}^3$. Consideration of pollution data from a town, say, London, showed that this type of concentration was apt to occur for short periods on any winter day, although the average concentration over the day would be much less and this again made one inclined to accept the reasonableness of the attitudes towards pollution from individual high chimneys as given in the inspectors' decisions and in the Ministry's Memorandum.

What had been said about calculations and results considered up to this point referred to normal dispersive conditions in the atmosphere. In times of inversion and smog the position was very much simpler because nothing could be done about emissions that did not escape above the inversion layer. Where they did escape they did so by virtue of the heights of the chimneys or of their own buoyancy. Hence, without exception, the higher the chimney the better. What had been said also assumed that the surrounding countryside was flat. In hilly countryside the dispersion of chimney gases was more difficult and each case had to be considered on its merits.

In conclusion Dr. Craxford thanked Dr. D. H. Lucas, of the Central Electricity Research Laboratory at Leatherhead, for the help he had

given him in connection with modern theory and methods of studying chimney plumes.

An Architect's View

Mr. W. Barnes introduced himself as an architect lacking expertise as far as chimney height was concerned. He sensed that architects were regarded as arch enemies because they designed "those monstrosities" and placed chimneys in all the wrong places. He assured his audience that many architects cared about the problem of chimney heights though many did not appreciate how important it was. He appealed to his audience to remind architects about its importance whenever a suitable occasion presented itself, they had to be converted and shown the problem in its true perspective.

Mr. Barnes explained that his lifelong sympathy for the coal miner had always encouraged him to seek to eliminate the need for men to work deep down in the bowels of the earth. He went on to call for the full use of all other alternative means of power. As the architect for a L.C.C. town development scheme at Letchworth he was responsible for the erection of some 1,500 dwellings. The first section of 384 houses, bungalows and flats had been completed without a single chimney on the estate. He believed this was the only way to avoid low-level SO_2 concentrations.

There were financial problems that an architect had to confront when considering the installation of chimneys and equipment in boiler houses. They had to consider their clients' instructions to reconcile good buildings with the type of heating best fitted to do the job and look at chimneys from the point of view of a guardian: how they affected the surrounding area and the buildings in the area. Mr. Barnes then went on to describe the role and function of the chimney in relation to town planning and emphasized the architect's custom of depending on the Heating Engineer for technical advice.

In the ensuing discussion members outlined their own problems, a recurrent one being the erection of chimneys of inadequate height by government departments. A reference was made to the acceptance of 800 milligrammes per cubic metre of SO_2 concentration by some medical officers of health, and a plea made for single chimney multi-flue installations. When replying to the discussion Dr. Craxford warned against unsightly roof top cyclones and arresters and reminded the meeting of the problem caused by down-draught from towers and high blocks. Mr. W. Barnes stated that most architects had not discussed the Memorandum on Chimney Heights. They would always accept high chimneys if facts were submitted to justify their installation.

YORKSHIRE

A meeting of the Divisional Council was held at Barnsley on Monday, January 18. At the conclusion of the business session the Council went to the Barnsley District Coking Co. Ltd. Works at Worsbrough. In small groups they were able to see coal handling methods and visit the coke ovens and power house. Members were particularly interested in the by-products and services and felt they had gained useful information about the reactive solid smokeless fuel "Barnsley BurnBrite". This fuel, an improved version of the National Coal Board's "Warmco", is manufactured from high grade coal in high temperature coke ovens in which constant carbonizing conditions are maintained.

Corrections

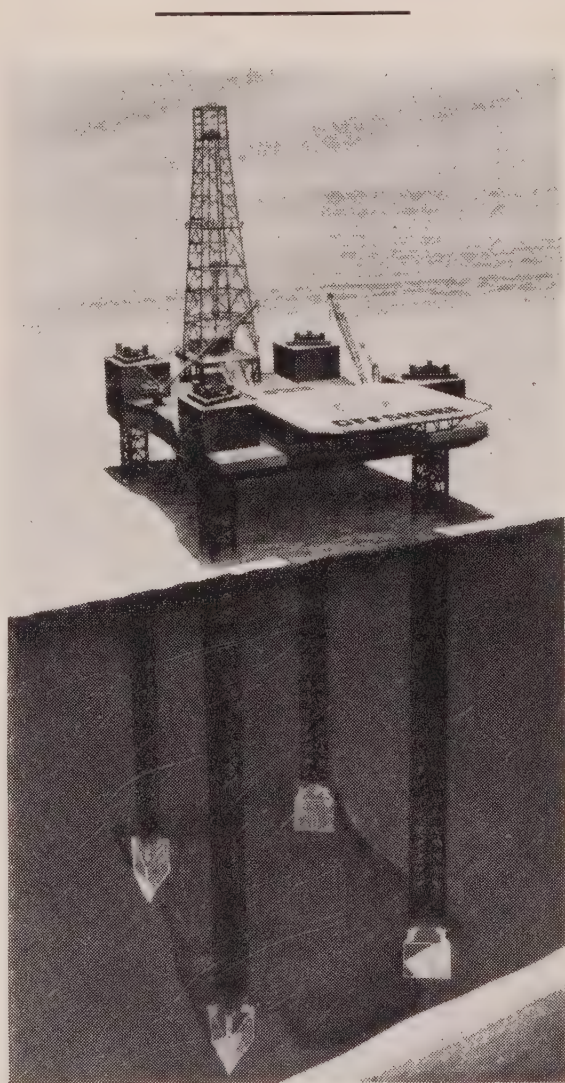
On page 99 of our last issue reference was made to a report on another page relating to Darwen, Lancs. We regret that because of lack of space this report had in fact to be omitted.

In the article on Section 95 of the Housing Act, 1964 (p. 110) the end of the fourth paragraph should read "conversions made before August 16, 1964", and the reference to this date in the next

paragraph should read "new dwellings begun on or after August 16, 1964". We are sorry if this transposition of prepositions should have caused any confusion.

In the review of the N.C.B. annual report, on p.119, mention was made of a new type of briquette sold as "Kentish Fire". The wording of the paragraph might suggest that this is a smokeless fuel, which it is not.

In the report, p. 153, of the visit of the West Midlands Division to the solid fuel handling plant at the Pensett Trading Estate, it was said that this was on the outskirts of Dudley. It should have been said that it is within the Brierley Hill U.D.



An artist's impression of one of the largest and most expensive drilling platforms ever, which is being built for the Gas Council-Amoco Group for use in the search for oil and natural gas in the North Sea. It is being constructed by John Brown of Glasgow and will cost more than £2½m

THE STORY-BOARD COMPETITION

The Society's "Design a Television Story-board" Competition, which was run in conjunction with last October's Annual Conference and Exhibition, continues to make news. The weekend before Christmas, one of the junior prize-winners, Miss June Mellor (age 14 years), of Ravensthorpe, Dewsbury, enjoyed her award—a visit to London, accompanied by her parents, staying at London's latest luxury hotel, the Europa, in Grosvenor Square, as guests of Grand Metropolitan Hotels Ltd. She was given "V.I.P." hospitality and a chauffeur-driven limousine was placed at her disposal by Embassy Travel Ltd., of London. During her three-day stay, she and her parents were the guests of Messrs. Cyril and Bernard Mills at Olympia and of Mr. Charles Forte at the Café Royal.


Miss Mellor also attended a New

Year's Party, accompanied by thirteen other prize-winners, at the A.B.C. Television studios in Manchester, where they met a number of television stars and watched rehearsals of programmes. Mr. E. J. Winfield played a very important part on this occasion by organizing the collection and safe return of the children who came from all over the West Riding.

In the Spring, the prize-winners will be taken on a visit to a power station as guests of the Central Electricity Generating Board and Miss Susan Robinson, the 13-year old first prize winner from Cullingworth, near Bradford, will be enjoying a holiday with a friend at a Butlin's Holiday Camp sometime during the summer. Also during the year, the first prize winners of the adult competition, Mrs. Olivia Barker and her husband, of Harrogate, will be taking up their prize of a week's holiday in Blankenberg as guests of the Belgian National Tourist Office and the Blankenberg Town Council.



The Story-board competition prize winners at the A.B.C. Television studios, with comedian Dick Emery and the "Barron Knights Group"



earway
Clean Air

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HIGH SPEED GAS

ISSUED BY THE GAS COUNCIL

AIR POLLUTION

ABSTRACTS

771. Review of Recent Studies of Sulphur Oxides as Air Pollutants. Thomas, M.D. (Journ. of the A.P.C.A. Dec., 1964, **14**, No. 12, 517-519). In reviewing the literature of the last ten years of sulphur dioxide and other sulphur compounds, the paper mentions the following themes: 1. Further development and comparison of various methods of air analyses—such as colorimetric, conductimetric, titrimetric, coulometric and lead peroxide. 2. Surveys of sulphur dioxide content of the atmosphere in many communities throughout the world, concluded by spot sampling, automatic analysers and lead peroxide candles. Permissible concentrations have been proposed in California and Russia. 3. Studies of the oxidation of sulphur dioxide to acid aerosol in the atmosphere. 4. Reactions of sulphur dioxide in photochemical smog. 5. Physiological effects on humans and animals. 6. Standards for maximum allowable concentrations in the atmosphere, particularly in Russia and the U.S.A. There are numerous references to papers on the above subjects and five tables of sulphur dioxide concentrations in various cities.

772. Status of Control of Motor Vehicles Emissions in California. Jensen, D. A. and Grant, E. P. (Journ. of the A.P.C.A. Dec., 1964, **14**, No. 12, 483-486). The State of California, because of an acute air pollution problem has been forced to move ahead on a pioneer basis to control motor vehicle emissions. The programme put into operation by the Motor Vehicle Pollution Control Board is discussed in detail. Inspection-installation stations, enforcement and legal requirements relating to crankcase control devices and other facets of the programme are presented. Of particular importance is the experience gained by the Board in requiring devices on all new vehicles registered in California and its used vehicle programme affecting vehicles back to the 1950 model year. Recent developments in exhaust control, anticipated installation requirements, and scheduling, as well as an indication of staff long-term planning is also outlined.

California's programme is based on the principle that the motor vehicle must be controlled and that sewage no longer can be dumped into the air if the public health is to be preserved.

773. Correction of Chimney Heights in case of Terrain Disturbance. (In German). Stuemke, Dr. H. (Staub, Dec., 1964, No. 12, 525-528) In an earlier investigation (Staub, vol. 24, 1964, No. 5, pp. 175-182) it had been shown that in cases when the level of the terrain is disturbed, effective chimney heights can be calculated as if the circumstances were normal, with the aid of a correction factor. The present paper now introduces a corresponding factor for increasing the chimney height. A method is then given for the calculation of the necessary chimney building height and discussed by a numerical example.

774. Domestic Power Station Installation. (In Japanese) Shimamura T. (Heat and Management, Sept. 1964, **13**, No. 9, 10-18). The installation of high pressure, high temperature power generators had been programmed for domestic use, the first one beginning to operate in 1961 and the second in 1964. The paper describes various theoretical studies made before installation, also the operation results and the detailed organization of management.

775. Ways of Establishing a Balance of Fuel and Power in the U.S.S.R. Mel'nikov N. V., and Zenkis Ya. S. (Thermal Engineering (Teploenergetika), 1964, Vol. **11**, No. 3, publ. for D.S.I.R. by Pergamon Press). Questions are considered regarding the creation of a fuel and power balance in the U.S.S.R. in conjunction with the technical progress in all spheres of the national economy.

776. The Pick-Up of Sulphur Dioxide by Paper. Hudson, F. L., Grant, R. L. and Hockey, J. A. (J. Appl. Chem., **14**, October, 1964, 444-447). The authors have further developed a method, using radioactive sulphur dioxide for examining the effect of variables such as humidity, temperature and furnish on the affinity of sulphur dioxide for paper. The tem-

perature coefficient indicates that a diffusion process determines the rate of uptake which is also almost linearly related to moisture content, being increased by storage under moist conditions. The paper concludes that Langwell's contention that even good quality papers can pick up enough acid from atmospheric sulphur dioxide to deteriorate rapidly, has been confirmed.

777. Air Pollution in the Coffee Roasting Industry. Partee, F. (Environmental Health Series, P.H.S. Publ. No. 999-AP-9, U.S. Dept. of Health, Education and Welfare, Sept. 1964). This review provides a guide for the inventorying and control of emissions arising from coffee processing. Information was collected from published literature and other sources. Emission factors were established for the various processes involved, *i.e.* roasting, stoning and cooling. The air pollution aspects of the production of regular grades, instant and decaffeinated coffee are discussed. Also discussed are the types and operating characteristics of control equipment used.

778. Dust in the Atmosphere as an Environmental Factor. (In German). Kettner, H. (Repr. from periodical No. 22 of Verein fuer Wasser-Boden-und Lufthygiene). The paper defines the nature of dust, its characteristics and behaviour in the atmosphere as well as in the respiratory system. Various dust measurement methods are described and illustrated and the results of deposited dust measurements are compared with those of suspended dust particles. Figures published in Paris suggest that suspended dust particles behave more like gases; there are also references to dust measurements in England and U.S.S.R. It is concluded that although the problem of large dust particles in the atmosphere may be considered as solved, this is not the case where very fine dusts are concerned. While dust deposits are growing less, the increase in urbanization and traffic will aggravate the amount of suspended dusts in the atmosphere and future research will have to concentrate on this latter problem.

779. The Simple Modification of a Commercial Sulphur Dioxide Meter for the Determination of other Atmospheric Pollutants. Nichols, P. N. R. (Chem. & Ind., 1964, Sept. 26, 1654-1655). The paper describes a modification of the Cummings and Redfearn sulphur dioxide meter, which can be readily applied to other pollutants. (BCURA 1642)

780. Air Pollution and Fuel Efficiency. (In German). Eickemeyer H. (Brennstoff-Waerme-Kraft, 1964, July, 16, 349-350). It is argued that from the point of view of air pollution, gas is the only permissible fuel for domestic heating systems. As far as fuel efficiency is concerned, heat power stations using gas turbines in high-consumption areas, would be preferable. (BCURA 1348).

781. How Effective are Additives in Oil-Fired Power Generating Equipment? Collins, J. O. and Cyphers, E. B. (A.S.M.E. Paper, No. 64-PWR-1, Sept. 27-Oct. 1, 1964). The problems with fuel oil ash and sulphur encountered when firing heavy fuels in boilers and gas turbines and the approaches studied in overcoming them are briefly reviewed. Laboratory bench-scale and pilot plant studies in equipment simulating high temperature boiler and industrial gas turbine operating conditions are described by which considerable insight has been gained into the chemistry of reactions of fuel oil ash and sulphur in the combustion process. The interactions of ash with additives to beneficially modify these reactions are discussed. The knowledge gained in the laboratory has been applied to full scale boiler and gas turbine operations. There appear to be inherent limitations however, which prevent the universal application of additives from completely solving the problems caused by fuel ash and sulphur. New and more promising approaches are being studied. (CEGB Digest Vol. 17 Jan. 1965).

782. Effects of Acute Exposure to Sulphur Dioxide on the Mechanics of Breathing in Healthy Men. Yokoyama, E., Kokuritsu Kosho Eiseiin (Bull. Inst. Publ. Hlth; Tokyo, 12, 22-28, March 1964). An experiment was made to confirm what effect an acute exposure (single or repeated) to sulphur dioxide might have on the mechanics of breathing in healthy men, and whether spirometric and peak-flow-rate tests are able to detect the effect of SO₂ on the mechanics of breathing, if such effects had occurred. Fifteen healthy adult male volunteers were exposed to SO₂ at a concentration of 15 to 30 ppm. Measurement of the mechanics of breathing was made with an intraoesophageal pressure technique. Exposure lasted for 10-15 minutes. Flow resistance and ventilatory work were elevated for 15 minutes thereafter, except inspiratory resistance. There were no consistent

changes in lung compliance and respiratory rate, but tidal volume increased. It is shown from these results that SO_2 acts to increase the flow resistance in the lung even in healthy men. Spirometric and peak-flow-rate tests done at the end of the exposure, however, showed no significant change. Three repeated exposures at one hour intervals were made in four subjects. Although the difference between the change in mechanics in each exposure was not statistically significant, there was some suggestion that an adaptation to SO_2 and also a superimposition of stress, might be possible. (WS)

783. Experiments on the Behaviour of Effluent Emitted from Stacks at or near the Roof Level of Tall Reactor Buildings. Davies, P. O. A. L. and Moore, D. J. (*Int. J. Air Wat. Poll.* 1964, 8, 515-533). The behaviour of effluent emitted from stacks projecting a few feet above the roof level of reactor buildings at Berkeley and Bradwell nuclear power stations has been studied using models in a wind tunnel and a water tunnel. Full-scale plumes from these buildings were also observed under a limited range of conditions; the behaviour of model and full-scale plumes was similar when the efflux conditions were similar. The experimental work indicated that the assumption of fairly simple effluent distributions for the purpose of calculating long-term-dose rates would not lead to serious errors.

784. Acute Hydrogen Sulphide Intoxication. An Unusual Source of Exposure. Kleinfeld, M., Giel, C., and Rosso A. (*Ind. Med. Surg.* 33, 656-60 Sept. 1964). An unusual accident which resulted in the release of lethal quantities of hydrogen sulphide was reported. Fifty-two of 89 workers present in the area at the time the gas was liberated manifested evidence of intoxication, and in 12 the intoxication was severe. Two of the 12 died. The systemic neurological manifestations predominated over the local irritative effects. Following exposure to high concentrations of hydrogen sulphide, the systemic effects first appear, then the reverse appear when the exposure is to low concentrations. Similar accidents can occur whenever sizeable amounts of material containing sulphur are stored or processed unless adequate control measures are taken. Periodic inspection of equipment and review of procedures are essential. Periodic air tests in the vicinity of operation are indicated.

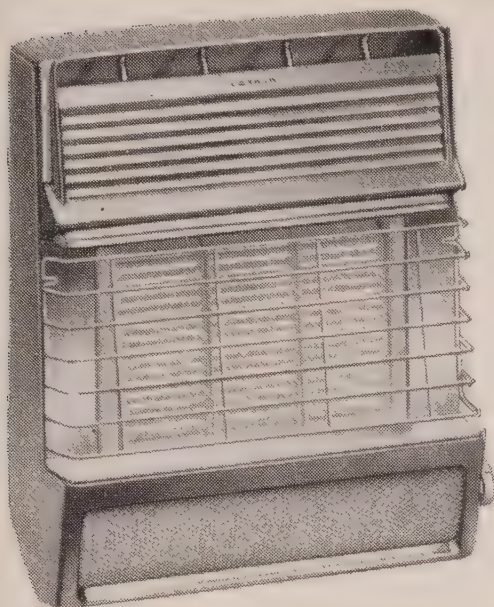
BRONCHITIS ON T.V.

Living up to its reputation for presenting dramatic, hard-hitting and well informed documentaries, the Granada Television "World in Action" took bronchitis as the subject of its half-hour programme on February 9. After a warning that nervous viewers might be upset to watch it, the programme examined the problem of bronchitis in Great Britain from the point of view of atmospheric pollution, smoking and environment, quoting differing medical opinions as to which of these was the most important cause, but concluding that they were all contributory factors. The relationship between bronchitis and air pollution was well presented and it was most gratifying that the N.S.C.A. (who incidentally provided most of the statistics) was mentioned when the President, Dr. A. Parker was interviewed on the sulphur dioxide problem. Dr. J. Burn who also took part, spoke with great feeling against the evils of pollution. Criticism may be made of the repetitive and macabre parade of coffins being carried through streets, to drive home the point that bronchitis was a killer, but perhaps this made an impact on a mass of viewers unfamiliar with the subject. All viewers must have been distressed to see the horrible sufferings shown with detail, of patients in terminal stages of bronchitis. The photography of smoky towns was excellent and taken as a whole, this was a very fair and effective programme.—V.F.

Warwickshire Clean Air Council

The seventh Annual Report of the Council, for 1963-4, is a 54 page volume of practical comment and discussion on the technical problems dealt with by the Council, and the record of air pollution measurements carried out in its area. It is the only report of its kind to be published by a local authority organization, and the constituent authorities and honorary officers are to be congratulated on the good work they are doing.

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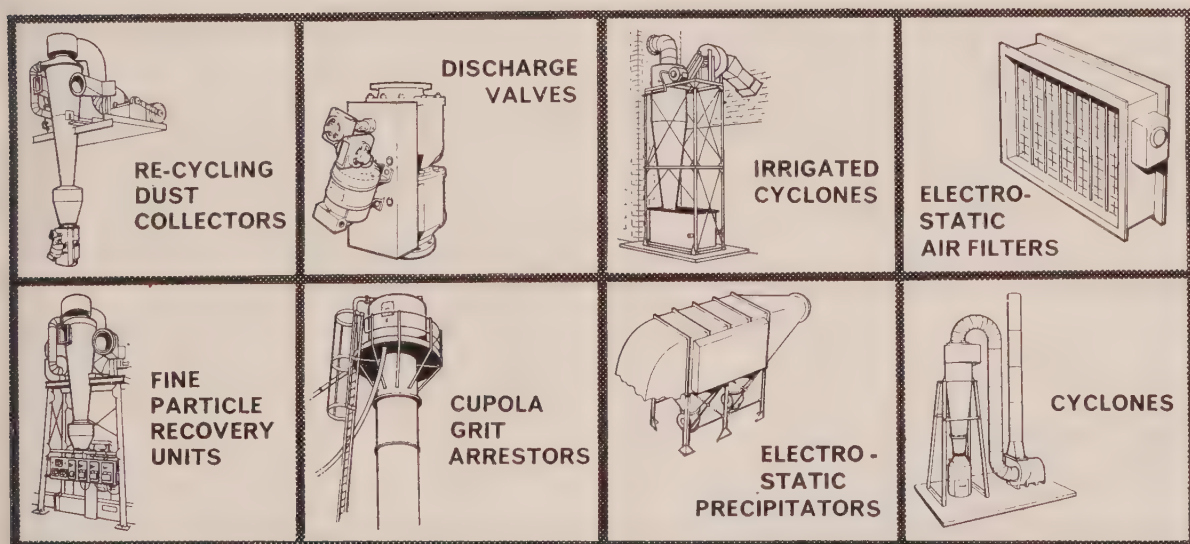
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CONTRIBUTIONS TO CLEANER AIR

Industrial and Commercial News

N.C.B. and Sankey

Agreement has been reached between the National Coal Board and J. H. Sankey & Son Ltd. under which they will join in a new Company to carry on the business of suppliers of solid fuel heating appliances, heating consultants and builders merchants.

The N.C.B. will be able, through the new Company, to take a direct interest in the sales of appliances which are vital to the sale of coal. To that extent, they would be placed on the same footing, though on a much smaller scale, as the Gas and Electricity Boards which own and operate showrooms throughout the country selling gas and electrical appliances.

The joint venture represents a new form of co-operation in the United Kingdom between the public and private sectors of business enterprise and follows a pattern which has been established for many years in various Continental countries. It is a natural and logical development in a mixed economy where nationalised undertakings and public companies operate side by side in similar fields.

The managing director of the new company is Mr. A. C. Hazel, formerly joint managing director of Powell Duffryn Heating Ltd. Mr. Frank Wilkinson and Mr. D. J. Ezra, of the N.C.B. will serve on the board.

Ekco Industrial Heaters

Forced-air convection is the principle adopted for two of the latest industrial heaters to come from Ekco Heating and Electrical Ltd. Designed to provide quick and efficient electrical heating for halls, offices, canteens, hotels, schools, workshops etc., the new Ekco Forced-air convectors are freestanding units of neat and unobtrusive appearance with statically and dynamically balanced fans for very quiet operation. They have an extremely low noise criteria level.

Two models are listed, Type TM2, 6 kW for single-phase supplies and Type TM3, 9 kW for three-phase supplies. Both have a thermal cut-out and an on-off switch. The element assemblies are based on the Ekco Thermovent type of element,

operating at black heat and the fan motors are of the shaded-pole type, with sleeve bearings, and sealed-in oil reservoir which require no attention. The fan assemblies can be withdrawn for easy cleaning without disconnecting the wiring.

Because of their low case temperatures, these heaters can be positioned against a wall without additional insulation and provision is made for fixing to either the wall or the floor. An Ekco wall-mounted thermostat Type E.T. can be used for temperature control, operating in conjunction with the usual contactor.

The 6kW type is priced at £48 2s., and the 9kW type at £58 2s.

Ekco also announce two new "Thermistor" electrical storage heaters for commercial and industrial application. Known as Types MSH2 and MSH33, they are respectively 2 kW and 3.3 kW heaters. Thermal insulation between the refractory material and the outer casing ensures the correct rate of heat dissipation and a double skin prevents back radiation to permit installation flush to a wall.

A thermal cut-out combined with a special pre-set thermostat prevents overheating. The thermostat also controls the effective mean loading of the 3.3 kW Type MSH33 to 3 kW, the average charge acceptance with an eight-hour charge being 20 kWh. The 2 kW Type MSH2 has an average charge acceptance of 15 kWh under the same conditions.

The smaller model costs £20 and the larger £28.

C.U.C. Housewarming Cavalcade

The flexibility and economy of modern solid fuel central heating is graphically demonstrated in the "Housewarming Cavalcade" which began its year-long 1965 exhibition tour in Esher, Surrey, on January 19.

During the year, the "Cavalcade" is scheduled to visit more than 20 cities and towns in England, Wales and Scotland. The provisional itinerary includes Orpington, Littlehampton, Clacton, Dunstable, Lincoln, West Hartlepool, South Shields, Edinburgh, Glasgow, Birmingham, Salisbury, Leicester, Gravesend, Farnham, Cardiff, Bolton, Preston and Winchester. It will also be on view during the summer at eight leading agricultural shows.



The C.U.C. Cavalcade on the road

This is the second year in which the exhibition has been on tour. In 1964, it travelled 3,000 miles, made 28 exhibition halts, was seen by many thousands of people and attracted 18,300 central heating enquiries.

During the winter it has been refitted by the Coal Utilisation Council's Publicity Department in order to feature a number of appliances, which have been approved since the exhibition began its first tour last April.

The Cavalcade comprises a convoy of five vehicles in a standard livery of golden yellow and pale purple. Three of these—giant articulated vans with towing tractors—can be formed up together on a level site and opened to provide a comprehensive “walk-through” exhibition, 90 feet in length.

The first section is devoted to partial central heating by means of open fires and room heaters with high output back boilers. Eight different examples of this popular solid fuel system are on show, including two models—an open fire and a room heater—demonstrated under fire and heating radiators. All the fires and room heaters are suitable for burning solid smokeless fuels and are suitable, therefore, for smoke control areas.

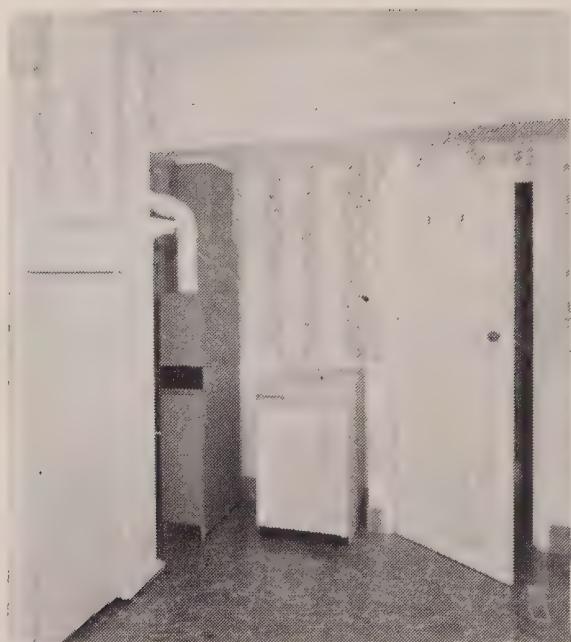
Danish Clean Air Heating System

The “Elvaco” system, originating in Denmark and operating extensively on the continent, is now being manufactured in England by Elvaco Heating Ltd., Feltham. It is a combined heating and ventilating system and works very simply. Fresh air is drawn into a ventilator unit where it is filtered and then passed through small underfloor polythene ducts to wall panels in each room, where it is wafted over low heat electric elements and into the room. It is not until the air reaches the point of delivery, *i.e.* the room itself, that it is heated, thus avoiding wastage of fuel in carrying warm air under the floor.

The room panels are about the same size as a wall panel radiator and these never get hot. Each room has an automatic thermostat and there is a time clock control. As fresh air is constantly flowing into each room, the atmosphere stays fresh and the correct level of humidity is maintained.

Potterton Warm-Air Heaters

Thomas Potterton Ltd., pioneers of gas and oil-fired domestic boilers, have decided to produce warm air heating



The Potterton gas-fired WarmAir Unit

equipment, to be known as Potterton WarmAir heaters. The first installation has been completed in a three-bedroomed, terraced house in Merton, London S.W.19, built about 1930.

The WarmAir heater, rated at 25,000-30,000 Btu/hr. is gas-fired and is installed in the kitchen. It provides fully automatic heat at 65°F in the lounge, dining room, kitchen and hall and 60°F in the two main bedrooms with "overspill" heat from the hall to the landing. The cost of the installation including ductwork was £250.

Potterton WarmAir units range from 20,000 to 90,000 Btu/hr. and all heaters are fully automatic and fitted with a Honeywell Adatrol gas control system, including an automatic fan control thermostat, limit control thermostat and press button electric ignition of a protected pilot.

Mr. A. G. Ludgater, Sales Director of Thomas Potterton Ltd., told *Smokeless Air* that between 1959 and 1964, the number of houses in this country with a warm air central heating system rose from 3,000 to 30,000. In the next five years, he expects this figure to increase to 230,000 and estimates that by 1970, half the new homes being built will have warm air heating.

New Heatstore Model

Heatstore Ltd., manufacturers of thermal storage heaters, have introduced a new controlled output storage heater

which represents a major step forward in the development of domestic and commercial controlled output heaters. Controlled output heaters now on sale are either too large for normal domestic use or have insufficient thermal capacity for the fan to be effective towards the end of the storage period before recharging. The Heatstore CF 3 controlled output heater, which is built to the high standards of safety and efficiency set by the testing and development laboratories of the Electricity Council, is compact and has the thermal capacity of some heaters twice its size. This is achieved by using a very high thermal capacity refractory medium running at a high temperature and by insulation consisting of magnesium silicate and pre-cut slabs of high value mineral wool.

The heater has been designed so that access to all moving parts is facilitated by the removal of a base drawer containing the twin cross flow and centrifugal fans and motor, the automatic air output temperature control, variable speed fan control and room temperature controller. This unique feature means that, if servicing or adjustment is required, it is unnecessary to allow the heater to cool or to disturb the elements, refractory blocks or insulation.

The heater has been designed to give out enough heat from the case to maintain a background temperature and the fans can be brought into operation when it is required to bring the room up to full comfort conditions.

Change of Name

Drummond Patents Ltd., manufacturers of wet process dust extraction plants has changed its name to Drummond Dust and Fume Extractors Ltd., in order to express the widening scope of the company's business.

Drummonds are now able to offer dry systems of extraction in appropriate cases including High Efficiency Cyclones and Fabric Filters, so that the whole range of dusts and fumes in varying conditions can be dealt with.

Parkray Clean Air Fire

Radiation Parkray Ltd. have issued a re-print of their consumer leaflet of the Parkray Clean Air Fire. The redesigned leaflet offers advice for installation and maintenance of the fire, together with an illustration and diagrams.

The Parkray Clean Air Fire, specially

intended to burn smokeless fuels, is available in bronze, black or gunmetal lustres, 14 in. or 16 in. wide, and costs £2 11s. 3d., accessories extra. Copies of the leaflet may be obtained from Radiation Parkray Ltd., Radiation House, North Circular Road, London N.W.10.

The New Smokeless Fuels

An interim progress report from the N.C.B. for the calendar year 1964 gives the following information:

Limited supplies of Homefire—the smokeless fuel for open grates—were available during the year in the London, West Midlands and North Western

Areas. The Board's first full scale commercial plant near Coventry is now being constructed and will be in production in the winter of 1965/66. When completed it will produce 650,000 tons a year.

The first plant to produce "Roomheat", a new smokeless fuel for room heaters and open grates, will start operation in the next few weeks at Markham Main in Yorkshire and supplies will begin to come on the market locally soon afterwards. It should be operating at full capacity at 120,000 tons a year during 1965. More plants of similar capacity are soon to be built, at Rufford Colliery, Nottinghamshire, and Killoch Colliery in Scotland.

NEW SAFETY DEVICE FOR OIL HEATERS

A safety device for portable oil heaters which automatically extinguishes the burner flame if the heater is overturned, lifted or even tilted more than 15° from a vertical position was demonstrated recently by The Valor Company Ltd.

The new safety device, claimed to be the first of its kind in a European manufactured oil heater, is initially being incorporated in a new, large appliance of 12,000 Btu.'s, the Valor Vulcan, as well as in new de-luxe versions of three appliances in the standard Valor range of cylindrical heaters, the Valiant, the Valorette 207 and the Major 658.

Mr. Michael J. Montague, Valor's Managing Director, has written to the other members of the Oil Appliance Manufacturers' Association—the representative trade association—stating that his company is prepared to grant to other O.A.M.A. members the right to manufacture under licence this patented device on payment of nominal royalties.

Mr. Montague told members "I believe that this safety device, developed on the basis of an idea I saw incorporated in an oil appliance made in the Far East, represents a significant technical breakthrough for the

industry. It will strengthen still further the very high standards to which the industry's heaters are now made.

"For this reason, and because I believe it is in the public interest that the device should be widely adopted, I hope that all manufacturers will be prepared to incorporate it in as many of their models as possible."

The new device consists of a simple mechanism which can quickly be reset by the turn of a lever when the heater is righted. When the heater is tipped, a hinged flap drops over the burner which extinguishes the flame by a swift current of air. This prevents damage to the wick. The flap then locks over the burner in a virtually airtight seal, which prevents spillage of paraffin onto the hot chimney.

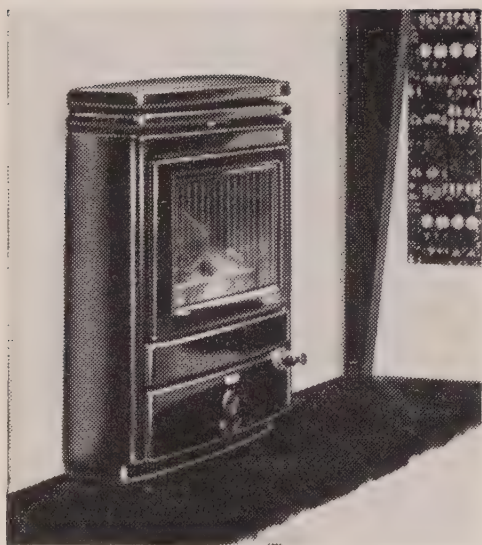
The first consignments to the domestic trade will be available in August 1965 for sale in the shops at the start of the domestic heating season.

Air pollution readings taken every day at Monkseaton Secondary School show that the seaside holiday resort of Whitley Bay (Northumberland) was more polluted than the heavily industrialized areas of Newcastle-upon-Tyne, Hartlepool, and Middlesbrough. Mr. W. W. Valentine, chief health inspector for Whitley Bay, said the pollution was nearly all from coal-burning domestic fires.

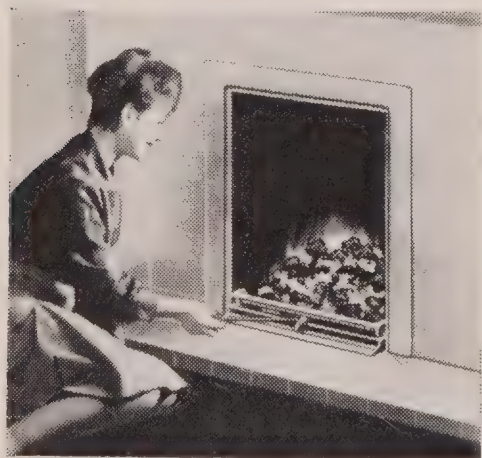
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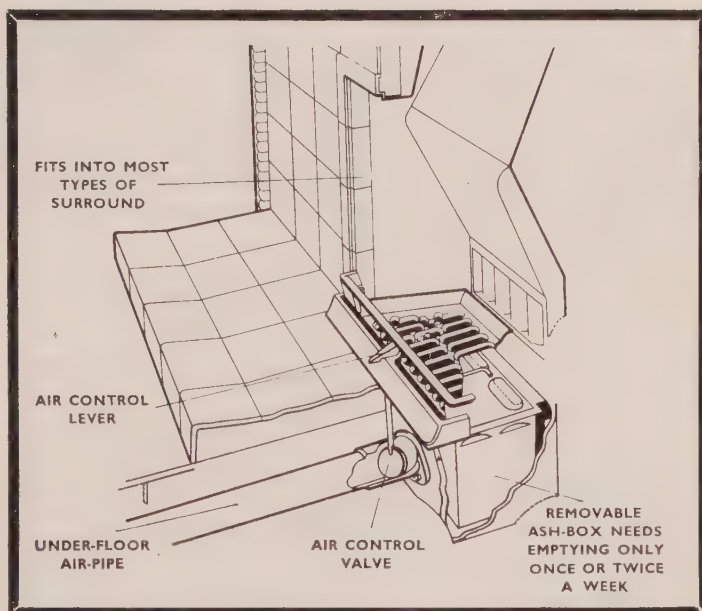
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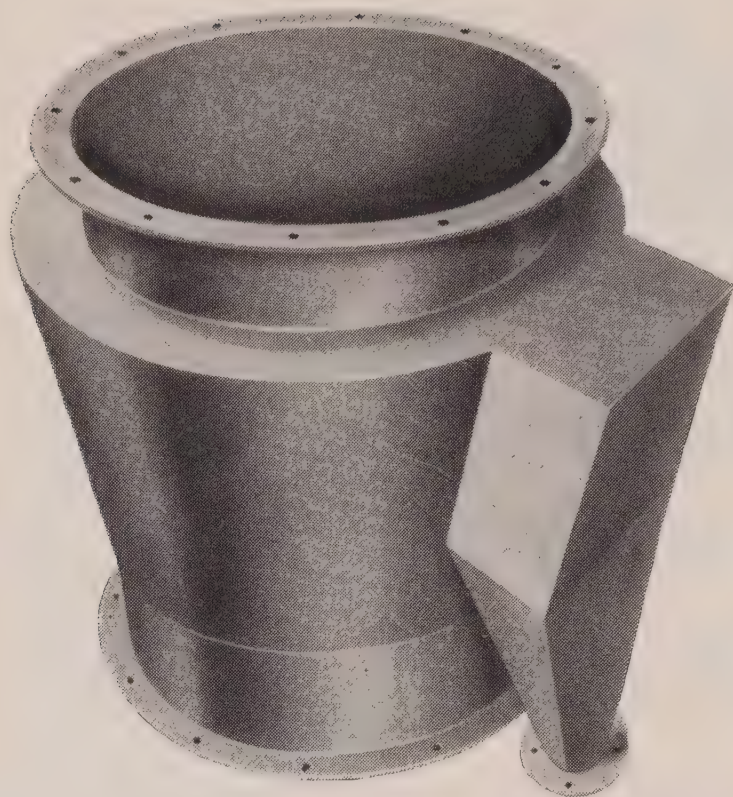
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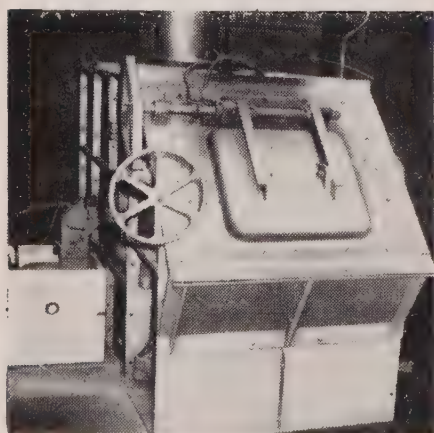
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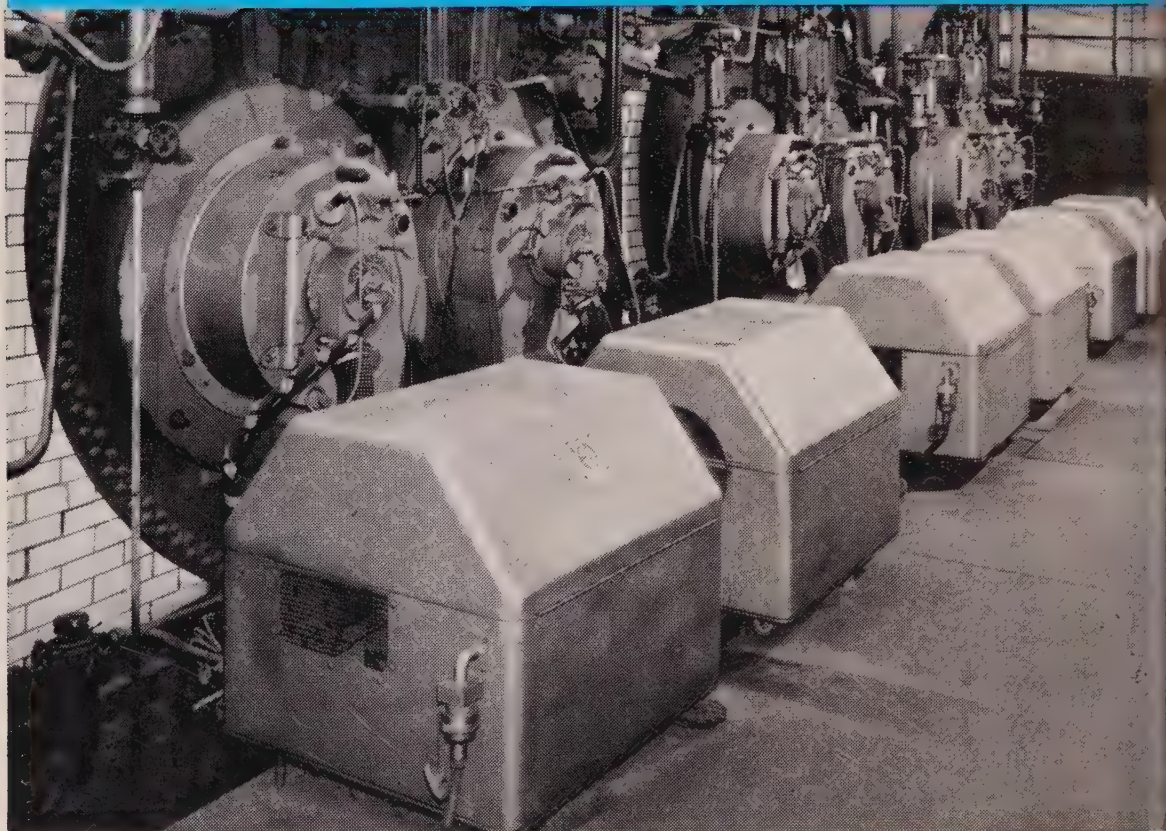
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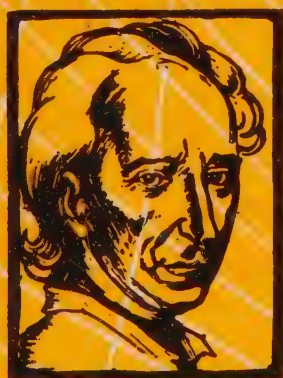
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JOURNAL OF THE
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In this Issue

Minister of Power on Clean Air
The Dusseldorf Congress and Exhibition
"Thou Hast Thy Smoke, Too"



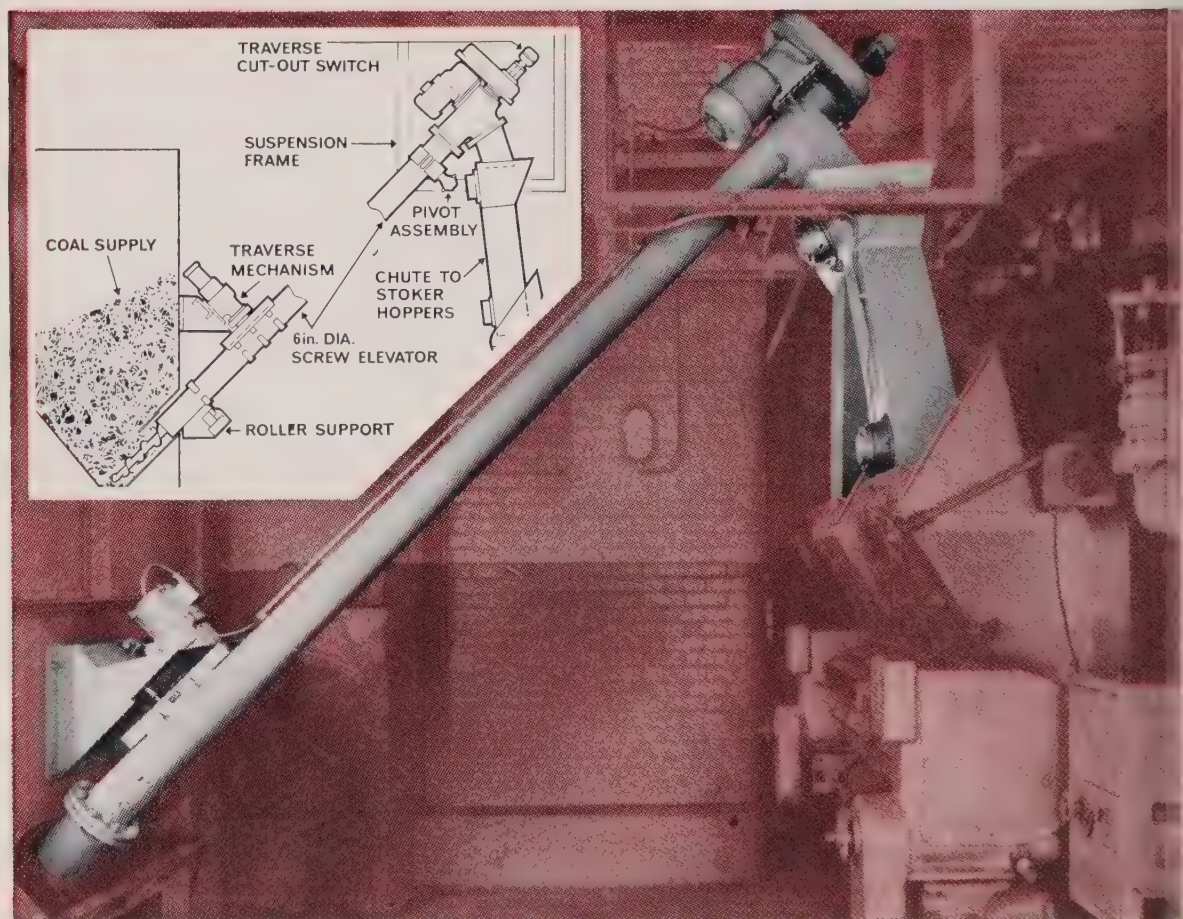
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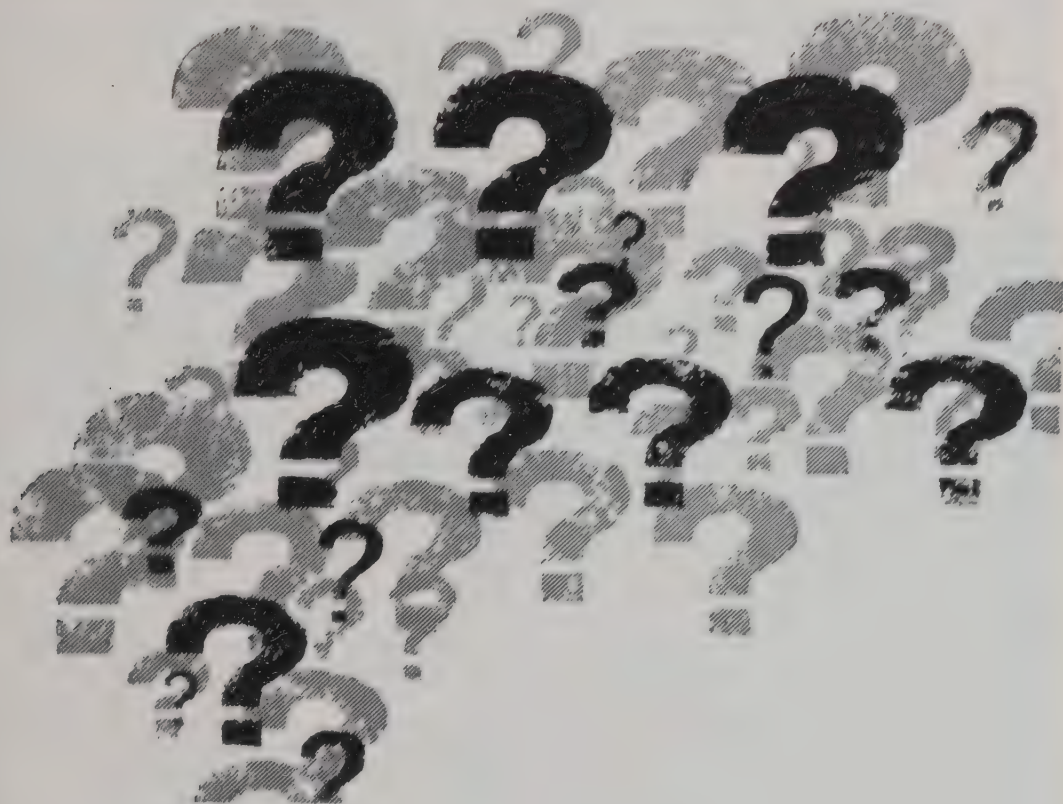
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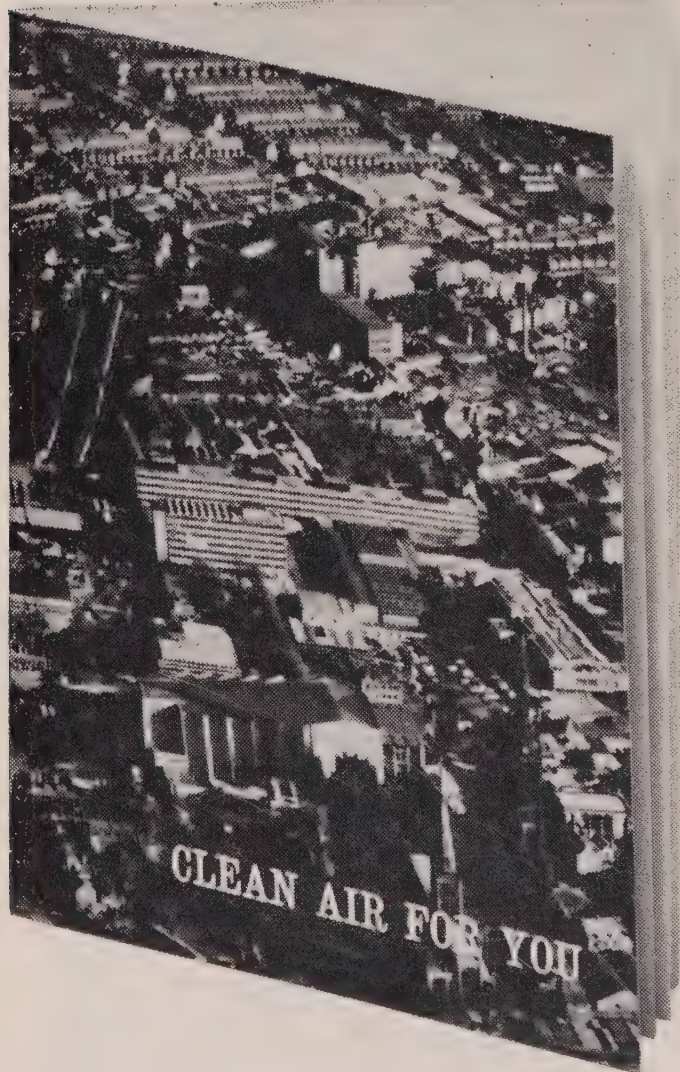
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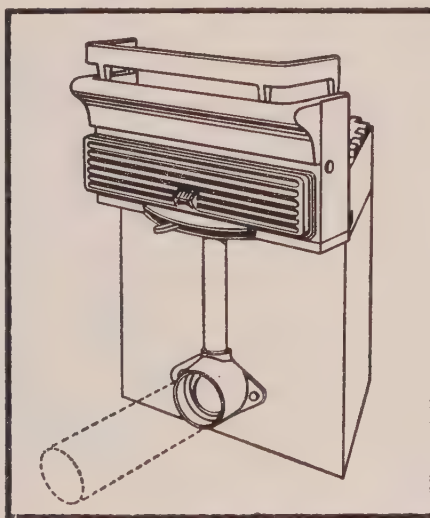
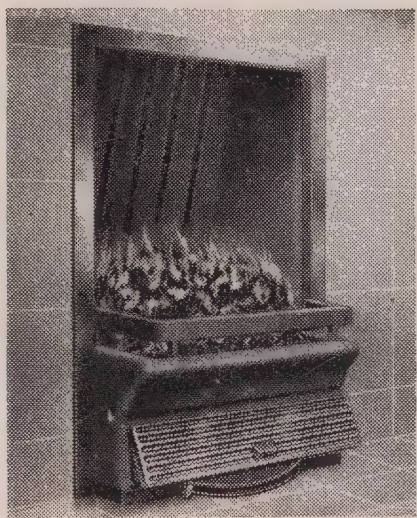
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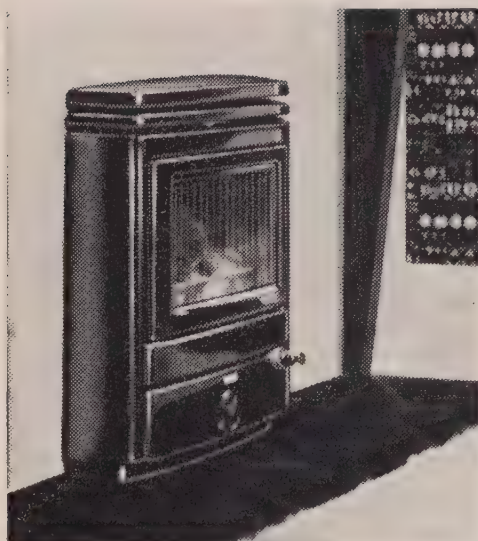
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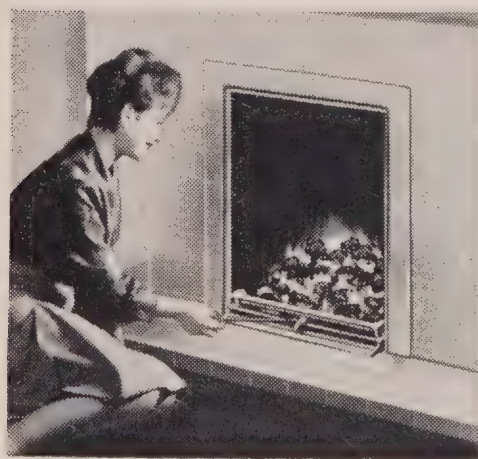
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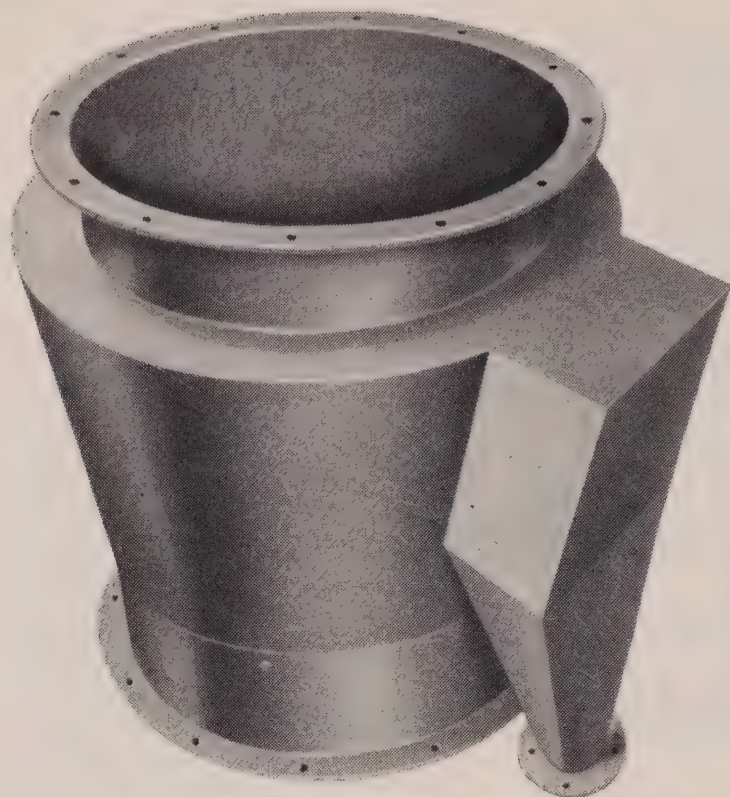
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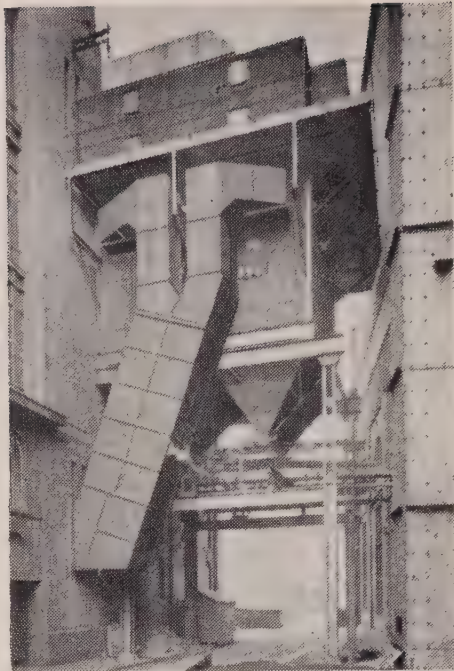


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Clean Air Lecture Notes, 1s. 6d.

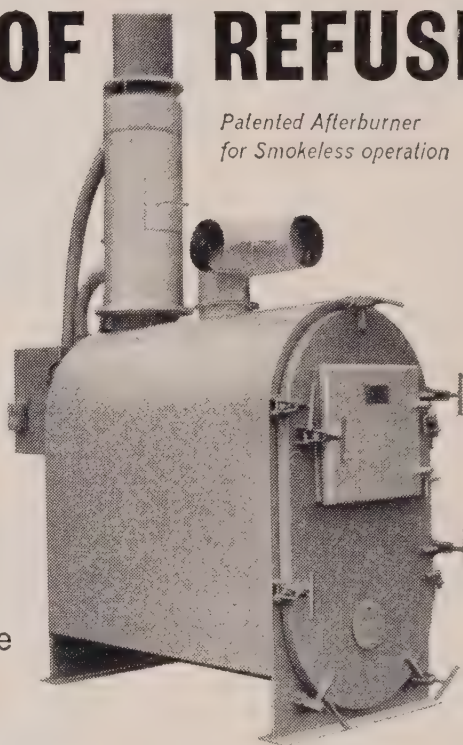
SPEAKERS' PANEL

The Society is preparing a panel of speakers on clean air topics for distribution to interested organizations throughout the country. Members who are prepared to give talks or lectures and who would be willing to have their names included in the panel are asked to inform the Director, stating the aspects of the subject on which they would be prepared to speak, and the area in which they would be available.

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SMOKELESS AIR

Vol. XXXV No. 134

Summer 1965

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Fuel Policy and Clean Air

DEMANDS for a national fuel policy are in the air again. It is not always easy to know what exactly is meant by a fuel policy, for the phrase seems to mean different things in different contexts, and to different people. In a changing, developing society such as ours, the shape or pattern of fuel usage must also be constantly changing. The pattern is determined by the needs of fuel users in industry, transport and the home, by the fuels and equipment that are available, and by relative costs. A fuel policy, which implies planning for the future, may be designed either to help forward the processes of change that are apparent, or it may be intended to interfere with them and to modify them for reasons outside and overriding the free fuel pattern. Unless a national fuel policy recognizes the changing nature of the fuel pattern, and has its own built-in capability for change, it could do more harm than good.

The need for clean air is one of the matters that seek to modify the fuel usage pattern for what we have called outside reasons, and today it is fully accepted as a factor that must be taken into account in any national fuel policy. Doubts were raised recently when the Government's expressed anxiety to safeguard the coal industry introduced a new factor that overrides the usage pattern as it is at present evolving. By some it was feared

that this would jeopardize the progress of the Clean Air Act. We do not think this is the case, and feel it would be difficult to disagree with the remarks made on this by the Minister of Power, Mr. Fred Lee, at the recent annual luncheon of the Society, as reported on another page. As the Minister pointed out, the measures being taken by the Government to promote the use of coal are virtually smokeless.

There is in fact little to worry about as far as smoke is concerned, for both coal and oil can be burned, in efficient modern appliances, without smoke, and especially in the space-heating installations that will be particularly affected by the Government's policy. It is when we go a little further, and consider sulphur dioxide emissions, that more difficult questions come up. The demand that is already apparent and is likely to grow, for still cleaner and purer air in the congested centres of the towns, will not mean a choice (or conflict) between coal and fuel oil, but rather a choice between these fuels on the one hand and the sulphur-free alternatives—gas, electricity and light oil—on the other. This, we believe, will come to be regarded, before long, as a further factor to be brought into a national fuel policy.

Mr. Lee, in his address, referred to the Energy Advisory Committee he has set up for the purpose of assisting in the formulation of a

national fuel policy. This seems an excellent development and we hope that its labours will be fruitful and that, among the many other things it will be concerned with, it will bear in mind—in the Minister's own excellent words—"that inevitably and irrevocably Clean Air will prevail".

Leeds Leads

We ask indulgence for this headline, but it happens to be the right one. It is to the Leeds Junior Chamber of Commerce to which we refer, for the first-class report it has just published on "Air Pollution in Leeds". This well-illustrated, thirty-two page booklet is the work of a study group of the Chamber. It is a sound job and we like and commend it, and for two reasons congratulate the authors and their organization. First, because it is a practical and well balanced survey of a problem that is not an easy one to deal with; and secondly because it is the first time that a Chamber of Commerce has even thought about such a project. From the point of view of our Society, and all who are working for clean air, it is good and immensely helpful that an association with no obvious axe to grind (and especially one of a kind usually associated with hard-headed business) should have studied the problem so fully and should have produced a document of this nature. Needless to say, the report comes down very definitely for clean air measures. We are sure it will do much good in Leeds itself, and we hope copies find their way into the Chambers of Commerce in other cities, and encourage them to do something similar.

Evading the Act

From time to time we hear stories of smoke control areas in which control of smoke emission is so lax, or even in desuetude, that householders continue openly to burn bituminous coal. Such cases are, we believe and hope, very few indeed,

but that any should exist throws the law into contempt. Reputable fuel merchants will not of course sell coal for use in smoke control areas, but its sale is no offence under the Clean Air Act. Nor is it difficult these days to buy a bag of coal in another area, pop it in the car, and take it home—perhaps to burn it after dark!

That such evasions can occur, even rarely, reveals a weakness in the Act. The only offence in a smoke control area is the emission of smoke. If there is no watch over chimneys, and during the hours of darkness, smoke may be emitted with impunity by those who care not if they break the law. It may only be a small problem, though it is the sort that might grow if not checked. What is the answer? We would be glad to have readers' views and instances of such contraventions.

It does seem that in this particular offence the Clean Air Act has not used the best practicable means for effective prevention. It was felt by some at the time the bill was being prepared that the best way to prevent coal being burned in open fires in smoke control areas would be to make it an offence to be sold. This would have followed the line of the Pittsburgh and other U.S. ordinances, under which fuel merchants are licensed to sell coal, and on pain of losing their licence must not sell high-volatile coal except for use in prescribed types of furnace.

The Young Observer

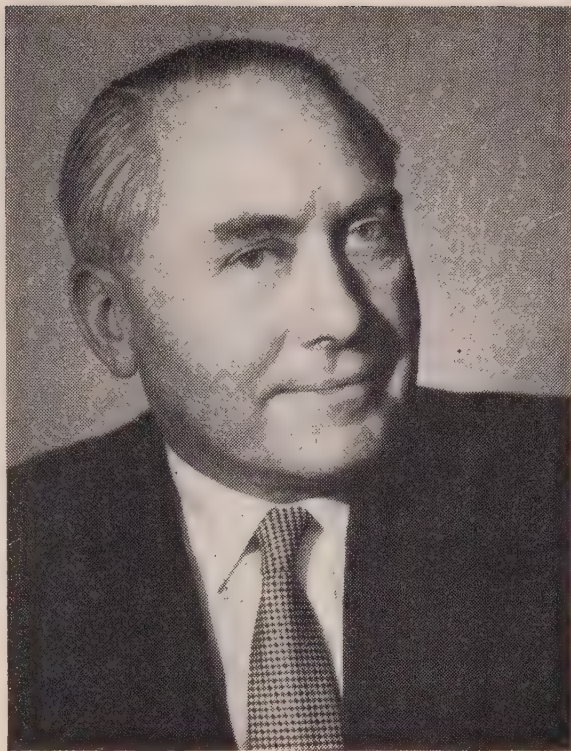
The article in our last issue entitled "Domestic Smoke at its Worst", by "Young Observer", created considerable public attention. It will be recalled that the author criticized the heavy smoke emissions from domestic chimneys in mining villages in the North East, where coal fires are large and long-lasting because of the abundance of concessionary coal. It is a thorny problem which is usually approached very gingerly indeed. The article was quoted in a number of

THE NEW PRESIDENT

At the Annual General Meeting of the Society on May 4, at the Connaught Rooms, London, the election was announced of Sir Alan Wilson, F.R.S., as President of the Society. Sir Alan succeeds Dr. Albert Parker, whose two-year term of office has been both active and most successful.

Sir Alan Wilson, who is chairman of the Glaxo Group Ltd., is a distinguished scientist and is, or has been, a member of many official and other bodies. He was elected as a Fellow of the Royal Society at the early age of 36, has published works on the theory of metals, semi-conductors, thermodynamics and statistical mechanics. He has also published many papers on atomic physics. Formerly a Mathematics lecturer at Cambridge University, he joined Courtaulds in 1945 and became Managing Director in 1954, and was deputy Chairman from 1957 to 1962. Among his other activities, Sir Alan is a member of the Iron and Steel Board, and of the Advisory Council on Scientific Policy. He was chairman of the Government committee on Noise.

Sir Alan will preside at the first session of the Society's conference



Sir Alan Wilson, F.R.S.

at Eastbourne, on October 26, when he will deliver his Presidential Address.

At the Annual General Meeting it was also announced that Mr. Stanley E. Cohen, c.c., had been re-elected as Hon. Treasurer. The elections to the Executive Council of Divisional representatives showed "no change" over last year's membership.

newspapers in the area, reporters interviewed miners, and a B.B.C. interview was included in a "Voice of the North" programme. The publication of the article in this journal, our press distribution methods and the follow-up in the region demonstrates how really "newsy" clean air stories can be brought before those concerned and the public generally. The results cannot of course be measured, but obviously it all helps to build up public understanding of clean air problems.

Incidentally, the nom-de-plume "Young Observer" is quite genuine. The writer is both a keen observer of social conditions and is quite

young. He has no connection with either a fuel industry or local authority, and it was for professional reasons only that his public-spirited article appeared anonymously. In view of the interest it has created this is perhaps, for his sake, just as well.

Electrical Association for Women.—Congratulations to the Association, which celebrated its 40th birthday in London with a conference that included a reception, attended by the Queen Mother, at the Guildhall. The E.A.W. now has 244 branches, and is a member of the N.S.C.A. Its Director, Miss Mary George, is Chairman of the Society's Publicity Committee.

Open Fire Smokeless Fuels

Ministry Circular on Improved Supplies

Circular 13/65 of the Ministry of Housing and Local Government, to local authorities in England and Wales, contains a statement made by the Parliamentary Secretary to the Ministry of Power, made to the Clean Air Council, on the subject of solid smokeless fuel supply. The purport of the statement, and of the circular, is to indicate that since the White Paper on "Domestic Fuel Supplies and the Clean Air Policy" was issued, the prospects for greater availability of the more reactive smokeless fuels, have considerably improved. It is stressed in the circular that "the references in the statement to increased production and availability of open grate fuels relate only to some of the specially reactive premium fuels. The White Paper forecasts of production of ordinary open grate gas coke, the cheapest open grate fuel, stand without material alteration."

The circular also includes a revised list of the coal and coke trade representatives to be consulted by local authorities contemplating making a smoke control order. A similar circular, and copies of the Statement have also been sent to Scottish local authorities by the Scottish Development Department (SDD Circular 23/1965).

The statement made by the Parliamentary Secretary, Ministry of Power, Mr. John Morris, M.P., reads as follows.

SUPPLIES OF SMOKELESS FUELS

1. The Council will be familiar with the assessment of supply and demand published in the White Paper of December 1963, "Domestic Fuel Supplies and the Clean Air Policy" (Cmd. 2231). This forecast that supplies of smokeless fuels of all types should be adequate to meet demand, with the exception of the open-fire

solid fuels. These were thought to be sufficient to meet the needs of smoke control areas then in operation or confirmed, but likely to fall short increasingly of requirements for new areas. The deficiency in the open-grate fuels, on the basis of producers' plans as they then were, taking account of the expected decline in the production of coke from gasworks, was estimated at 400,000 tons in 1965, rising to two million tons in 1970. It was recognised that the estimates, particularly for the later years, were subject to large margins of error.

2. One of the conclusions of the White Paper was that further efforts by producers to increase the output of open-fire fuel should improve matters, and that the producers should take such action in this direction as could be economically justified. I am pleased to be able to tell the Council that the National Coal Board and the private producers are now going forward with plans for increased production of open-fire fuels which should materially improve the situation predicted in the White Paper.

3. Since the estimates were made for the White Paper, the National Coal Board have announced plans for manufacturing one million tons a year of Roomheat, a new premium fuel suitable for use either in open grates or in openable stoves, and the manufacturers of Coalite and Rexco have informed me that they are likely to increase their production by nearly half a million tons above their earlier estimates for 1970. Supplies of the gas cokes Cleanglow, Sebrite, Phimax and Gloco, are likely to conform broadly with the White Paper estimates; so are supplies of Homefire and Phurnacite. The Roomheat production and the increased Coalite and Rexco output is planned to come into operation during the next two years, so that the producers aim to reach not only higher figures than those incorporated in the White Paper estimates, but also to reach them earlier. These prospects of additional supplies of reactive fuels, together with the

possibility of further development of capacity in later years if needed, indicate that supplies of open-grate fuels should be adequate to meet expected demand although consumers may sometimes have to buy more expensive varieties of reactive fuel when their first preference would be the cheaper gas cokes.

4. These production plans, which require the installation of large new manufacturing plant, are necessarily subject to some degree of variation, particularly where new processes are involved, and the producers will naturally take account of the way in which the demand for their fuels develops in developing their plans for the future. However, it is clear that the general outlook for open-grate fuels shows a marked improvement over earlier prospects. I have spoken so far in terms of total supplies over the whole country, but I am also advised by producers that they expect regional difficulties in the supply of reactive open-grate fuel to be largely overcome during the next two years.

5. As regards the solid fuels suitable for use in closed appliances, including anthracite and hard coke (Sunbrite), the producers inform me that they expect to be able to maintain supplies at least at the level estimated in the White Paper.

6. Solid fuels, of course, are not the only smokeless fuels within the scope of the clean air policy. There are also gas, electricity for storage heaters, and oil. Supplies of all these fuels should be adequate to meet demands. Looking at the whole picture, therefore, there should be a wide range of smokeless fuels available, thus ensuring, together with existing grant provisions, an effective freedom of choice. Consumers, and local authorities in exercising their responsibilities for smoke control areas and for their own housing, should be able to choose that fuel and appliance which best suit their requirements in the light of their own circumstances.

7. Naturally the relative prices of the different fuels, and of the appliances that burn them, are important factors in consumers' choice. It is not for me to make predictions about the prices of the various fuels, or the relationship between them. Market considerations will play their part in determining these prices. Consumers and local

authorities will naturally wish to weigh up all these factors—price, convenience, availability and so on—in the light of the information they can obtain from their local suppliers. I hope that they will be assisted in their task in that way and also by the necessarily rather general picture I have given this afternoon about supply prospects.

Advisory Service on Acid Soot and Odours from Oil-Fired Plant

Some three years ago the Warren Spring Laboratory of the Department of Scientific and Industrial Research set up an advisory panel to give local authorities and owners of plant assistance in dealing with acid-soot emission from oil-fired plant. All instances of acid-soot emission subsequently notified to the Laboratory were passed on to the technical department of the oil company concerned and it is significant to note that in all cases the remedy has been found without the necessity of consulting the advisory panel.

However, as oil-fired appliances for domestic and central heating purposes are becoming more widespread the frequency of enquiries regarding odours from them may well increase. It has been decided, therefore, to enlarge the terms of reference of the advisory panel to include odours as well.

The first approach about odours should be made to the oil company concerned, and only if the trouble persists should the panel be consulted. Enquiries to the panel should be addressed to the Director, Warren Spring Laboratory, Gunnels Wood Road, Stevenage, Herts.

Industrial Air Pollution Course

The Department of Occupational Health and Applied Physiology of the London School of Hygiene and Tropical Medicine, in conjunction with the M.R.C. Air Pollution Research Unit, held a successful five-day course in March on "The Measurement and Control of Industrial Air Pollution". The course, largely attended by people in industry, included 21 lectures and a number of visits.

The Minister of Power on Clean Air

Address to the N.S.C.A.

The Minister of Power, the Rt. Hon. Fred Lee, M.P., was the principal guest at the Society's annual luncheon in London on May 4. Responding to the toast of "The Guests", the Minister spoke as follows.

I AM very grateful for your invitation which gives me the opportunity to re-affirm the interest of H.M. Government in Clean Air.

I feel you will want to know something of our intentions as regards fuel policy. As Minister I must keep wide perspective over the whole field of fuel and power. Its ramifications spread over the whole industrial and commercial life of the country and in one form or another enter every home. In the last twenty years the country's requirements for energy have increased by over 40 per cent—from 200 million tons of coal equivalent to the present figure of about 285 million. To meet these growing demands, we have basically four industries—coal, oil, gas and electricity—all of which operate on a very large scale—larger in fact than many people realize.

Capital investment in the coal, electricity and gas industries, under programmes already approved will be in excess of £850 millions in the financial year 1965-6; on past showing this could well be roughly one-eighth of our total national investment; and the annual capital investment by the British oil industry in the U.K. is at the rate of some £100 million.

Each industry has its own important part to play in helping to meet the country's energy requirements. The Minister of Power's duty is to see that these requirements are met in a co-ordinated and efficient way. To do this, a co-ordinated national fuel policy is essential. Such a policy must ensure both that the country has

enough energy to meet the requirements of the growing economy and that the way in which those requirements are met is that which is best suited to the needs of the nation as a whole.

I am at present engaged in a comprehensive review of fuel policy. In this review and in carrying out the policy, I will have the benefit of the advice of the Energy Advisory Council which I set up earlier this year and which had its first meeting in February. The Council meets under my Chairmanship. On it are representatives of the fuel and power industries, of industry generally and of the Trade Unions. The Council is therefore particularly qualified to offer expert advice which will be of great value. Since the Council's terms of reference are to advise particularly on plans and policies in relation to national objectives for economic growth, it is particularly appropriate that industry should be strongly represented on the Council.

Nonetheless I would like to assure your Society that I will have the interests of the domestic consumer and the necessity for continuing to extend clean air very much in mind when considering this matter. This is said not merely from my personal belief in your cause but from the more hard headed reason that inevitably and irrevocably Clean Air will prevail. People, and particularly younger people, have been acquiring a desire for higher standards of comfort and convenience in their

homes and this, coupled with the rapid rate of rebuilding and flat building that is going on, will continue the momentum of the movement your far-sighted pioneers launched in 1899. Recent evidence of this, of course, lies in the rapidly increasing sales of partial and complete central heating in all its forms, of solid fuel and gas fired room heaters and electric storage heaters.

A recent instance of fuel policy may be of interest. With your concern for Clean Air, you naturally look at the coal industry from a rather particular point of view. But we should not lose sight of the fact that coal provides the base-load of our energy requirements; and, moreover, more than half of the total consumed in this country is used by the consumer not directly but after it has been converted into another—smokeless—form of fuel. Coal is at present our only significant indigenous source of fuel. As such it is an invaluable national asset, one which we must ensure is used to the best advantage for the country as a whole. As I announced last month, the Government is looking urgently at some questions concerning the finan-

cial position of the National Coal Board and has agreed a number of short-term measures which should help to maintain the coal industry's market in the current year at a rather higher level than it would otherwise be. Some of these measures involve the co-operation of the other nationalized industries; others are being taken by the Government but all the uses of coal it is proposed to encourage you will be glad to note are virtually smokeless. Although the Government is not responsible for decisions affecting local authority buildings in general, my colleague, the Minister of Housing will soon be drawing the attention of local authorities and similar bodies to the policy which we are adopting over the choice between coal and oil in Government buildings. But this is all essentially in the short-term. In the long-term, coal—and all the other fuels—must be fitted into our national fuel policy and our national plan.

I am often asked in Parliament and elsewhere whether I propose to continue this or that line of the former administration. Thus Questions are sometimes raised about the effect of the policy of financial objectives



At the lunch meeting. L. to R.: James Goodfellow, Chairman (almost hidden), Stanley E. Cohen, Hon. Treasurer, Arnold Marsh, Director, Dr. A. Parker, retiring President, Sir Alan Wilson, new President, and the Minister of Power, the Rt. Hon. Fred Lee

on the prices of the nationalized industries. My colleagues and I considered this matter shortly after taking office. We were impressed by the need for the nationalized industries to earn a reasonable rate of return on the extensive capital which they employ if the country as a whole is to secure a proper rate of expansion and is to avoid a possible misallocation of scarce resources. We accordingly stand by the policy of financial objectives for the nationalized industries. At the same time, we expect these industries to make every effort to absorb increases in costs by increasing efficiency and I keep in close touch with the nationalized fuel industries about their plans for cost saving.

In the sphere of your own more immediate interest I agree that we must move with and not against the fuel techniques of the times. I also see little need to suggest variations in the sensible arrangements of local authorities negotiating direct with fuel producers and distributors for supplies for their Clean Air schemes. This, coupled with the wide provisions for freedom of consumer choice seems to me to put responsibility into the hands of those closest to the problem and with the greatest incentive to act wisely since they will have to live with the results.

We live in an age of rapid change and nowhere is this more evident than in the kinds and numbers of heating appliances now being installed in homes as compared even with ten years ago. Ten years hence, if hopes for nuclear energy and the discovery of plentiful supplies of natural gas are fulfilled, there may be even more extensive changes in the popularity and economy ratings of the kinds of fuel available.

Despite these hopes or fears (according to your outlook) for the future, we still have to live in the present and since your last annual conference at Harrogate there have been firm announcements of increased supplies of premium smokeless fuels

soon to be forthcoming from the National Coal Board and the private manufacturers. These additional supplies, taken in conjunction with the supplies of premium solid smokeless fuels, gas coke and hard coke shown in the White Paper of December, 1963 (and whose availability has recently been reaffirmed by the producers) and the ample supplies of gas, oil and off-peak electricity, should provide a firm fuel basis on which all local authority Smoke Control programmes can be fulfilled and any leeway that may have occurred in the past eighteen months overtaken.

The fuel industries are competing to burn smokelessly in modern style in your service. I will not weary you with a catalogue of their achievements but each has a well deserved place and advantages for particular uses or economy in particular circumstances. These merits I am sure they have explained to you, and I trust that your wise selection among them will improve our health and urban outlook for the future.

Well, I conclude by congratulating you on the great job of work which you do in the education of the public in these matters, and the way in which you have so many people able willing to give of their time and their capacity in what I believe is an essential service to the community. I wish you every success for the future in the work you do. It is of course ridiculous that we should be polluting the atmosphere of our cities in the way we still are. Indeed from a purely economic point of view, I should have thought it rather crazy that we take our greatest, our most valuable indigenous fuel and put it in an open grate, where a large percentage of the heat we generate goes up the chimney, which gives us bronchitis—and then we pay shillings in the pound in rates to get rid of the bronchitis and term this the civilization of the second half of the 20th Century! I congratulate you upon your educational efforts. I wish you every success for the future.

Cleaning St. Paul's

Address to the South East Division, N.S.C.A., on April 2.

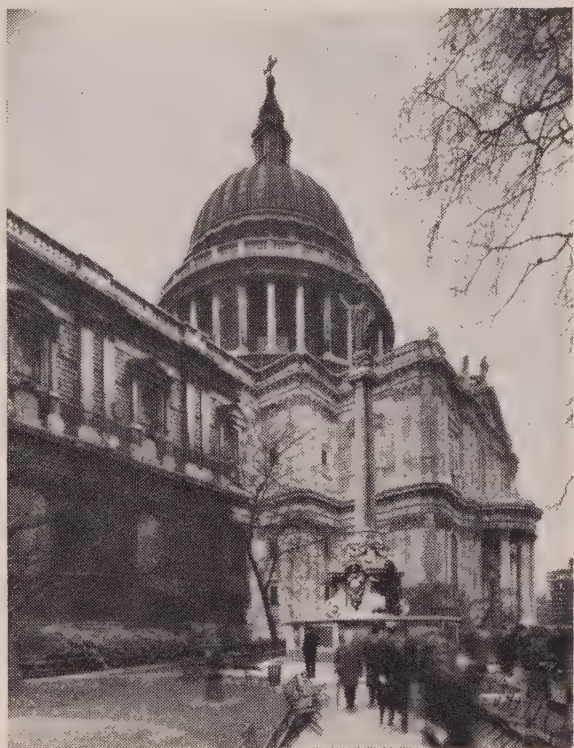
by Paul Paget, F.S.A., F.R.I.B.A.

Surveyor to the Fabric of St. Paul's Cathedral

MR. Paget began by expressing the thanks of all lovers of fine architecture and of St. Paul's Cathedral in particular, to the National Society for Clean Air without whose resolute stand for smoke abatement any attempt to clean the stonework of buildings in Central London would be fruitless. In this connection he also wished to pay a special tribute to the Society's Honorary Treasurer, Mr. Stanley Cohen, who as a leading member of the Corporation of London had been instrumental in securing valuable safeguards as to the grade of fuel oil to be consumed in the vicinity of the Cathedral.

Turning now to the historical aspects of the problem Mr. Paget reminded his audience that there had been complaints about the damage caused by coal smoke and its disfiguring effects even before the building of Wren's Cathedral. Referring to Old St. Paul's King James I is said to have been "moved with compassion for the decayed fabric which he described as being 'near approaching ruin by the corroding quality of coal smoke'".

As early as 1700 Timothy Nourse in the "Campania Felix: A Discourse on the Fuel of London" expressed the fear that the new St. Paul's Cathedral, then building, would look old and discoloured before it was finished and might suffer "as much damage by the Smoake as the former Temple did by Fire". Again in 1710, the year of its completion, the Cathedral was described in the Travels of Zacharius Conrad von Uffenbach as being "already so black with coal smoke that it has lost half its elegance". That an effort was made to dislodge



the clinging London soot by spraying the outer walls with a special engine in preparation for a Service of Thanksgiving attended by Queen Anne in 1702 disposes of any suggestion that Sir Christopher Wren was inclined to allow a patina of London grime to emphasize, if not distort, the carefully balanced chiaroscuro of his masterly composition.

Turning from the 17th century to the present day, Mr. Paget explained that it was in the Summer of 1962 that there had been a lively correspondence in the Press as to whether or no the stonework of St. Paul's should be comprehensively cleaned so that it might look less begrimed in comparison with the vast new blocks of offices being built all around it. It was as a result of this correspondence that the two original benefactors came forward—Mr. Behrens



A section of cornice showing incrustations of grime, and the same cornice after cleaning

and Mr. Trusted of the Ionian Bank—with an offer to defray the cost of cleaning the entire West front including the bell tower on the North and the clock tower on the South.

This work was started in the Autumn of 1962 and was completed in time for a great service of the Order of the British Empire a year later in October 1963. During the course of the cleaning a number of interesting discoveries were made. For example, it was found that the frieze of the cornice for the West portico is composed of white marble and not like the rest of the building of Portland stone as had hitherto been supposed. Mr. Paget suggested that the use of marble in this position might well have been intended for a carved inscription over the main entrance to the Cathedral, such as had existed on the previous frontispiece designed by Inigo Jones.

Such was the success of this first stage of the cleaning that Sir James Harman decided that an Appeal for funds to clean the remainder should represent one of the major good causes of his term of office as Lord Mayor of London, and this was duly announced at his Inaugural Banquet in

Guildhall in November 1963. A ready response to this appeal enabled the work on the North side of the Cathedral to be resumed in the Spring of 1964 and at the time of speaking good progress had been made up to and including the Transepts on both sides. It was confidently expected that all below the main roof level would be completed by the Summer of 1965 and it was hoped that the stonework of the drum supporting the Dome and the lantern above it would be finished before the end of 1966.

Giving brief particulars of the methods of cleaning used Mr. Paget explained that the whole of the work is being carried out in close collaboration with the Building Research Station, and the method adopted consists of removing heavy incrustations with spinners, using suitable discs, or sand blasting machines with aggregates to suit the type of work to be done. The stone is then sprayed with water to soften and remove most of the deposits and finally brushed down with bronze brushes.

To ensure that the men and plant are economically used it is essential



A carved panel of fruit and flowers, quite possibly the work of Grinling Gibbons, before cleaning and after cleaning

to have an adequate water supply. The water is drawn from a fire hydrant and fed through 2 in. diameter polythene pipes into a 1,000 gallon storage tank, which is placed at ground level adjacent to the walling being cleaned. During the first stage of the cleaning it was found that the supply was inadequate and it was therefore decided to recover as much of the water as possible for re-use. Near the base of the scaffolding corrugated iron sheeting is laid sloping inwards towards a gutter formed of 12 in x 1 in. timber, lined with 3-

ply bituminous felt. The gutter falls towards the storage tank where the water is filtered through a fine copper gauze.

Mr. Paget concluded his talk by showing a number of slides to illustrate the extent to which the architectural details had been hitherto concealed by sooty incrustations and the amazing beauty and sharpness of the carved enrichments which have been revealed by the cleaning, as can be seen from the photographs which accompany this report.

IN PARLIAMENT

Exhaust Fumes

Sir R. Russell asked the Minister of Transport what progress is being made in preventing the excessive emission of fumes from the exhausts of motor vehicles.

Mr. Tom Fraser: The development of exhaust control devices in this country and also in the United States continues, as does medical research here into possible dangers to health from exhaust fumes.

Meanwhile, I am continuing roadside checks to combat the avoidable nuisance of smoke from diesel-engined vehicles.—*February 12, 1965.*

Smoke Control, London

Mr. Longden asked the Minister of Housing and Local Government how many local authorities in the Greater London area have put into operation the Clean Air Act, 1956; and what is preventing those authorities which have not yet done so from doing so without delay.

Mr. Mellish: The areas of 83 local authorities in Greater London are classed as "black-areas" for purposes of the Clean Air Act, 1956. Eighty of these authorities are carrying out smoke control programmes. Of the other three authorities, two consider that smoke control is not needed in their areas, and the third has prepared a programme but wishes to revise it before carrying it out.—*March 4, 1965.*

Smoke Control

Dr. Summerskill asked the Minister of Housing and Local Government what financial assistance he is giving local authorities to expedite the implementation of the Clean Air Act; and whether the implementation of the Act is being slowed down by the short supply of smokeless fuels.

Mr. Mellish: My right hon. Friend pays grant to local authorities at the rate of four-sevenths of their expenditure on fireplace conversions in private houses in smoke control areas and two-fifths of their expenditure on conversions in their own houses. He has no evidence that progress is being slowed down by shortage of smokeless fuels.

Dr. Summerskill: Will my hon. Friend bear in mind that, in my constituency of Halifax, the target date for clean air is as distant as 1977? Does not he agree that this delay, which is common to many towns in the industrial North, might be reduced if more financial assistance were given to local authorities?

Mr. Mellish: If there is any way in which we can help my hon. Friend's constituency we will do so. About 216,000 premises have been covered by smoke control orders in the last six months as against 175,000 in the previous six months, so there has been an improvement.
(*May 11, 1965*)

THE URBAN FACTOR IN BRONCHITIS

A communication under this title was published in *The Lancet* of February 27, 1965. The authors are W. W. Holland, M.D., B.SC.LOND., Senior Lecturer, Department of Clinical Epidemiology and Social Medicine, St. Thomas's Hospital Medical School, London, and D. D. Reid, M.D.ABERD., D.SC.LOND., M.R.C.P., Professor of Epidemiology, London School of Hygiene and Tropical Medicine.

The paper refers to earlier geographical studies of bronchitis mortality which had implied the importance of air pollution and social class structure in explaining the rural/urban differential in the incidence of this disease. Each of the methods of investigation, it is suggested, has its limitations and, for example, death rates "may reflect the effects of the urban environment on the terminal stages of the disease rather than on its initiation or evolution". The well-known post-office morbidity survey was, for instance, based entirely on official sickness records.

There was thus a need, state the authors, for an approach by which the use of similar occupational groups in different areas could be combined with standardized methods of interrogation and examination applied by

trained and tested observers. The present communication reports the result of such a survey.

Two groups of post-office workers were selected for survey. The first consisted of 293 men employed as mail-van drivers and vehicle maintenance men in central London; the other, 477 men employed either as mail-van drivers or engineering workers also driving vans in the areas in and around three county towns in southern England—Gloucester, Peterborough, and Norwich.

A standard questionnaire concerned such matters as morning, day, and persistent cough and phlegm, wheezing, dyspnoea, and asthma. Lung-function tests were made, and sputum production and type was measured and compared. Smoking habits were noted and classified.

The tables and figures given in the report show clearly the respiratory deficiencies of the London group and also the influence of smoking on the frequency of respiratory symptoms. Geographical comparisons must, therefore, take differences in smoking habits into account.

The differences in smoking habits do not explain the greater frequency of respiratory disturbance among the London men, as shown by both

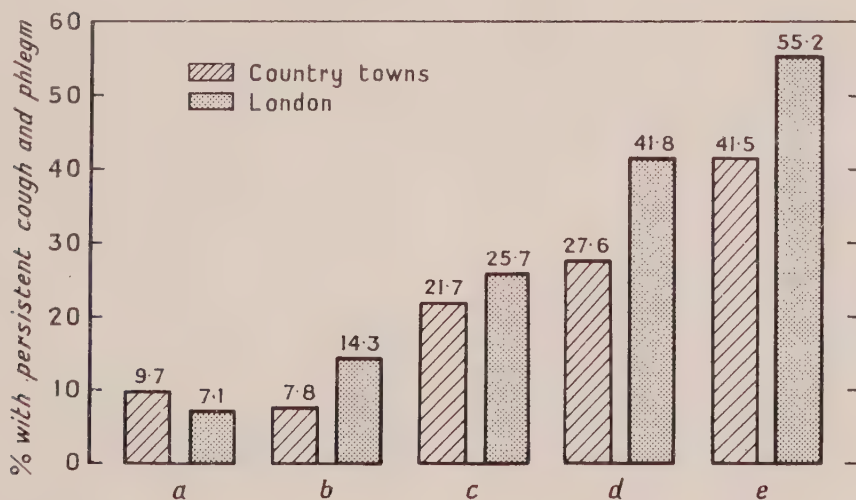


Diagram from the paper reviewed above, showing frequency of respiratory symptoms in non-smokers and smokers. (a) non-smokers, (b) ex-smokers, (c) smokers, 1-14 g. per day, (d) smokers, 15-24, (e) smokers, 25g. or more per day. 1 cigarette=1 g. of pipe tobacco

sputum and lung-function observations. This is seen from Figure 1 of the paper, which is reproduced here.

It was also found that "below the age of 50 the London men have significant excesses only for cough and phlegm production throughout the day, and for breathlessness of Grade II or more. But over that age the London excess is clear for most symptoms and especially for the severer forms of respiratory disturbance. Indeed, among the London men there is for most grades or disturbance a definite age trend which is practically absent in the others."

The factors that might be responsible for the poorer lung function of the Londoners are discussed and all but air pollution are found not to be

acceptable. The discussion concludes:

"Because there are so many aetiological factors in chronic non-specific lung disease, it is difficult to isolate the effect of any one of them. Nevertheless, the approach used here ensures that at least the major variables—occupation, income, physique and smoking—can either be equated or readily taken into account. This review of the likely residual factors suggests that the relatively high level of air pollution is the major reason for the excessive frequency of severity of chronic bronchitis in London".

(The report's own summary is reproduced as an abstract in the Air Pollution Abstracts section of this journal, on page 299.—Ed.)

Harrogate Conference

Professor Page's Reply to Discussion

The following reply to the discussion on his paper on Air Pollution and Town Planning was received from Professor J. K. Page too late for inclusion in the Conference Proceedings. We are glad to be able to publish it here.

Mr. Goss had rightly distinguished between the problem of reducing pollution in existing towns, and its control in new towns. The problem is more difficult in existing towns as most of the planning decisions that might have been effective have already been taken in the past.

I suspect that the basic problem is not so much one of guessology as Mr. Goss indicated, but guessology on the part of the people who have to make the decisions and who very often know very little of what is already known about pollution control. In other words I think the problem is partly a matter of educational advance. I entirely agree with Mr. Goss about the need to make a balanced environmental assessment, and control of excessive air movement in towns is a desirable design objective in our rather cool and often bleak climate. I do not think pollution should be given excessive prominence in site selection, but rather I think, town planners should be alive to the pollution problems likely to arise from

their decisions, and take effective technological steps to minimize them.

Mr. Goss and Mr. Thomas both emphasized the importance of knowledge of micrometeorological factors in design, and I was pleased to hear of the increased prominence being given to the subject in schools of planning.

Mr. Draper raised the old conflict between pollution control and aesthetics in chimney design. I think the Ministry recommendations on heights of chimneys are often unacceptable on architectural and construction cost grounds, and I think it may be better to seek other methods of control: increased discharge velocities, compulsory use of fuels of lower sulphur content, etc. I frankly do not believe that our present knowledge of air flow round buildings is good enough to make the Ministry recommendations reliable anyway except for isolated buildings. I think these rules have their place in industrial developments, but are likely to prove unacceptable in residential and commercial areas, where aesthetic values are more important; and where air flow patterns are more complex.

I entirely agree with Mr. Detrie that pollution is likely to be a function of density for a given type of fuel and

pattern of combustion. Electrical heating had an important role to play especially for short term heating, and for central heating in areas of high density. The economics of electricity, however, for central heating, are not particularly favourable unless the standard of thermal insulation is relatively high, and there have in fact been many complaints about high costs of off-peak electric heating systems among low income groups. Costs per delivered therm are very much higher than for certain alternative fuels. Mr. Gordon drew attention to the relatively low capital costs of electrical floor working systems. He failed, however, to discuss the relatively high capital investment per kilowatt of generation capacity say compared with gas producing plant for heating. As far as national investment is concerned, any on-peak system of electrical heating adds significantly to capital cost of the national system. The element cost and the national system cost are not the same thing. Mr. Gordon discussed one aspect of the contribution of electricity to clean air.

Use of electricity shifts the place of combustion but does not eliminate pollution, and unfortunately there are many older urban power stations producing relatively high levels of pollution in towns. My own region around Sheffield boasts several fine examples. Such stations are severe causes of pollution. Mr. Lewis's remarks underline the importance of thorough technical and economic studies. Unfortunately the majority of local authorities, for obvious reasons, are excessively preoccupied with capital cost financing, and it is important they should move over to more sophisticated accounting procedures that assess total costs in use.

I believe legislative steps may have to be taken to control the use of high sulphur fuels on certain locations.

Dr. Gräfe has suggested that Dr. Craxford got his facts wrong over the north-south pattern of pollution, and I agree with Dr. Gräfe. The winter isotherms run north-south and the fuel demands in the east are greater than in the west. The pollution pattern does not show gradient.

CORRESPONDENCE

*The Editor,
Smokeless Air*

SULPHUR DIOXIDE

Sir,

In your Spring, 1965 issue Dr. D. Davies wrote on the subject of power station siting with particular reference to the additional contribution that the Generating Board's large modern stations would make to SO_2 concentration in nearby urban areas. He suggested that such stations should be sited "ten or more miles from large centres of population".

Considering firstly the actual effect that these large stations are likely to have on SO_2 pollution levels in their vicinity, Dr. Davies said that "estimates of the order of 3 pphm had been put forward by the Central Electricity Generating Board". I am not sure of the origin of this figure since, in respect of the Ratcliffe and Fiddlers' Ferry power stations mentioned later by Dr. Davies, the CEGB estimated the long-term

average SO_2 concentration as being "less than 0.5 pphm" and "less than 1 pphm" respectively, (the coal supplies for Ratcliffe having a lower sulphur content than those for Fiddler's Ferry). Similar estimates apply to the eight other stations of 2,000 MW capacity at present under construction. The likely validity of these estimates is borne out by a recent extensive survey around a 1,000 MW station, where the long-term average SO_2 concentration from the station over a winter period was found in practice to be little more than 0.1 pphm.

The Generating Board are therefore confident that the addition that these large stations will make to local pollution levels will be quite insignificant; a view which, as Dr. Davies admits, appears to have been shared by the Medical Assessor at the Public Inquiries into the two stations named above.

Dr. Davies goes on to suggest that the siting of power stations close to

urban areas is "foolish" and "not even necessary except on the basis of somewhat marginal economy". Marginal is, of course, a relative term; the fact is that if the Generating Board fail to secure the use of the best site for a station of 2,000 MW—for which the requirements are extremely exacting—then the economic penalty of using an alternative site is usually of the order of several million pounds. To saddle the electricity consumer with this extra cost burden, unless it can be shown to be strictly necessary, is surely equally "foolish". The practical evidence being acquired both in this country and abroad increasingly supports the Generating Board's view that dispersion from tall chimneys is firmly established as a positive and effective method of emission control, and that the expenditure of further money for this purpose is, in fact, quite unnecessary. These views have stood the test of two extensive Public Inquiries and are endorsed by many eminent experts in the clean air field.

Quite apart from the above considerations, Dr. Davies grossly underestimates the difficulties of finding sufficient power station sites well away from large urban areas, particularly when so much non-urban land is protected in one way or another, and when the siting policy he advocates would inevitably lead to an increase in the requirements for transmission lines.

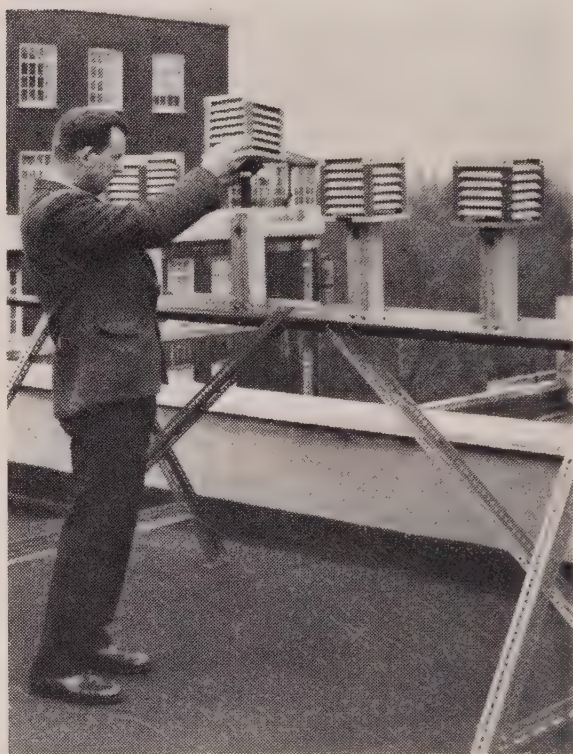
Finally, even if it were possible to site power stations no nearer than 10 miles from the large urban areas, it would be quite impossible to avoid siting them near to population centres of smaller size, and the DSIR have shown that small towns can be as badly polluted as large. If Dr. Davies were correct in his contention that these power stations were an undue hazard to the larger population, then they would equally be a hazard to the smaller. The Generating Board could not accept that numbers alone should be a criterion in this matter. The real position, however, is that the risk of these stations seriously in-

creasing SO_2 levels in their vicinity has always been remote—and becomes more so as experience continues to confirm the validity of the engineering principles on which their design is based.

Yours faithfully,

A. J. CLARKE

*Principal Assistant Engineer,
Central Electricity Generating Board*



A.P. Instrument Check

Materials used in air pollution measurements being tested by the B.S.I. on the roof of British Standards House in Mayfair. The special apparatus shown had been installed so that exposure tests could be carried out on the materials. The B.S.I. Hemel Hempstead Test Centre is now the only approved central reserve for these measuring materials, taking over responsibility for their certification from the Warren Spring Laboratory.

LATE NEWS

The N.S.C.A. has just decided to organize an International Clean Air Congress and Exhibition, to be held in London in October, 1966. The programme will stress air pollution prevention in practice.

The Dusseldorf Congress and Exhibition

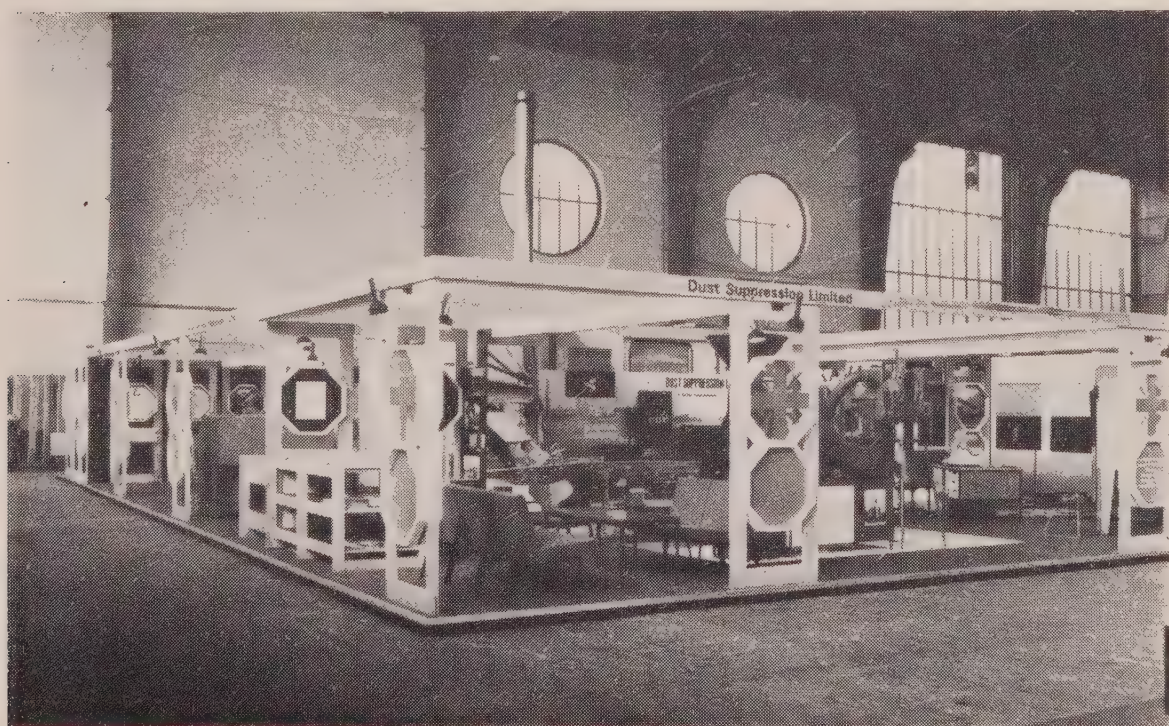
Success of British Joint Exhibit

THE International Clean Air congress and exhibition held at Dusseldorf from April 5 to 9, was regarded by its sponsors, the Reinhaltung der Luft, or Clean Air Commission, of the Verein Deutscher Ingenieure (VDI) and the Nowea exhibition organization, as highly successful. The British Joint Venture Stand, organized by the Board of Trade and the National Society for Clean Air, with the co-operation of the participating exhibitors, can also be said to have been a marked success.

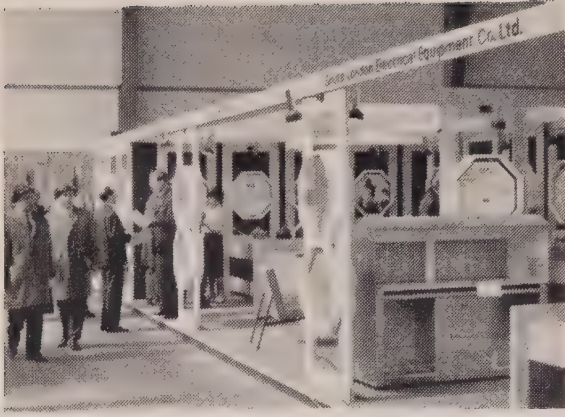
As the building-up proceeded with a smoothness and efficiency made possible by the willing co-operation of all concerned, those taking part noted approvingly the austere and yet impressive outline of the stand which had been carefully designed and erected by the Central Office of Information and their contractors

after the individual needs of exhibitors had been thrashed out in a series of seemingly endless meetings in the stand designer's office. Consisting of a plain, oiled wood structure with vertical and horizontal members neatly pegged at right angles, its most effective characteristic was the series of octagonal panels accommodating the essential data and names of exhibitors. These alternating with colour photostats combined to give a quietly impressive effect.

Despite the adequacy of the British stand, quite unmistakable with its octagonal Union Jacks strategically located, it was somewhat overwhelmed by the number and size of larger stands filling the enormous hall where the exhibition took place. In addition to the stands of 135 German and foreign firms participating the V.D.I. had arranged an



The British Joint Venture Stand at the Dusseldorf Clean Air Exhibition



Left: Visitors at the N.S.C.A. section of the Joint Stand. Right: The British Consul-General, Mr. Andrew Rankin (centre) and the Consul Commercial, Mr. R. Link (r.) with Mr. Alan Mister at the N.S.C.A. stand

Information exhibition of most ambitious proportions. The British Exhibitors were the largest foreign group, other non-German groups coming from Belgium, France, Italy, Holland, Austria, Switzerland, Liechtenstein and the United States.

After the official opening of the Congress and Exhibition at which German Ministers of State and leading Land Ministers were present, a steady stream of visitors came to the stand which created great interest, particularly among technicians and local government officers. 5,000 stand folders had been printed and about 2,000 circulated in advance by exhibitors to their own clients and friends and by the Society to a selected group of 300 possible customers selected with the co-operation of the Board of Trade. An effort was made to distribute the remainder to all who showed interest in the stand. The folder was strictly functional consisting of a strikingly contemporary frontispiece the story of Clean Air and the Society's effort to achieve it, as editorial matter, a large plan and finally the names of individual exhibitors and their equipment on show. This included a clean room, measuring instruments, space heaters, gas sampling apparatus, air filters, recovery units, scrubbers, a working model showing the erection of a steel chimney and a further working model which demonstrated the effect of buildings on the discharge of smoke from chimneys. The latter

exhibit which was organized by the Ministry of Technology, attracted a constant stream of technicians in this field who often returned to the stand with business associates to operate the model.

Distinguished visitors and friends of the Society received on the Stand included the British Consul-General in Dusseldorf, Mr. Andrew Rankin, the Consul Commercial, Mr. R. Link, the Scientific Councillor at the British Embassy in Bonn, Mr. R. Ashton, Dr. H. Stephany (V.D.I.) Dr. J. Juda, D.Sc. Academy of Science, Warsaw, Dr. Ing. V. G. Thurnau of Frankfurt, Mr. J. Fitzpatrick, Director, Air Pollution Control, Chicago, Dr. S. Pedrero, Madrid, Professor E. R. Hendrickson, Florida, U.S.A., (President of the Air Pollution Control Association) Dr. R. Buchert, Finland, Mr. F. M. Shaw, B.I.C.R.A., Birmingham, Dr. Ing. Kettner, Dip. Ing. Krämer (V.D.I.), Dr. Ing. P. Lorant, Vienna, Dr. P. Spaanter, State Institute of Public Health, Utrecht, Mr. D. R. Bouwer, Du Ponts, Geneva, Mr. J. J. W. Bogaart, Malaysia, Dr. Ing. Edmund Hunigen, Head of the State Vehicle Research Institute, German Democratic Republic, Dr. I. Ohtsuka, Central Institute of the Electric Power Institute, Tokyo, Francis Vanderveken, Civil Engineer, Brussels, Mr. W. C. Hopper, B.P. Research, England, Herr J. Schneider (V.D.I.), Dip. Ing. N. Tebensco, U.S.S.R. and three senior ministers of the



The entrance to the Information Section of the Exhibition

Bavarian Land Government.

On duty at the Society's section of the stand throughout the exhibition were Mrs. V. Finlay, Information Officer and Mr. Alan Mister, Assistant Secretary—the latter having been in charge of the general organization of the venture.

During the Exhibition, Mr. Marsh, as Director of the Society was interviewed on German television and besides explaining his purpose and role in the Congress was able to commend the equipment on display and its potential value to German industrialists. Mr. Marsh's paper to the congress, on "Education and Clean Air" was one of the few from overseas. An abstract is included with others elsewhere in this issue.

The social aspects of the venture were mainly spontaneous and snatched during those few moments of withdrawal that were possible. A party for the British exhibitors was arranged by the Society and attended by the bulk of the stand staff. At the end of the week, Mr. Franklin, The Consul-General, invited exhibitors and colleagues in the V.D.I. and the Nowea organization to a cocktail party in his home overlooking the Rhine.

It is still early to make a detailed assessment of the full value of the venture. Although at an exhibition of this type it is unusual for equipment to be sold from the stand, one firm had received two orders which could be considered to be firm. One of the orders was placed by a representative of

an English engineering firm. Another firm's exhibit created so much interest that if all the inquiries should materialize, the firm would be fully engaged in their specialized field for many months to come. The same firm also received numerous inquiries for the manufacture of their products under licence. Other exhibitors were able to discuss agency requirements with prospective agents and expressed the hope that working agreements would be concluded, and on strictly business terms one equipment manufacturer has informed the Society that a £3,500 deal was concluded on the final day of the exhibition. A winding-up meeting will be held in the near future.

Grit Emission from Cupola

At the Halesowen Magistrates Court on Tuesday, February 23, G. B. Parkes Limited, Crown Works, Halesowen, were summoned for failing to use means to minimize the emission of grit and dust from a cupola furnace as required by Section 5 of the Clean Air Act, 1956.

Mr. J. F. Hayward for the Halesowen Borough Council said that Mr. A. Archer, Chief Public Health Inspector had examined the cupola at the firm's premises and found that it was not equipped with any means of grit suppression. Assuming that the cupola worked for three hours a day and melted two tons of metal per hour it probably discharged into the atmosphere about 150 lb. of grit and dust per day. The Clean Air Act had been in operation for several years and the Council had taken steps to see that industrialists were aware of their responsibilities under the Act. The Council felt this failure to comply with the Act showed a disregard for the interests of the community.

For the firm it was argued that they had been considering the question of suitable plant for some time but the problem of suppressing grit and dust from cupola furnaces was a difficult one in respect of which there were different views. No one could say what was the best type of plant to be used and when a firm was called upon to spend perhaps £2,000 or more it was necessary to use care in making a decision.

The firm were fined £20 and costs.

NEWS

New Newsletter

The Royal Dutch/Shell Group has published the first number of a "Science and Technology Newsletter", which gives brief notice to topics arising from the activities of the 500 companies and the major research establishments within the Group. More information can be obtained from the Editor, at Shell Centre, London, S.E.1, or Shell Oil Company, 50 West 50th Street, New York 10020.

The first issue has a note on the development by the Thornton Research Centre of a new and sensitive method of detecting and measuring unburned hydrocarbons in automotive exhausts. There is also a paragraph about developments in the Fuel Cell at the Thornton Centre—the first fully integrated power system producing useful amounts of electricity from methanol and air. The cell, developing 5 kw, yet compact enough to be mounted on a 15 cwt. utility vehicle, was demonstrated publicly last December.

Combustion Engineering Association.—Brigadier J. V. Topham has retired as Director of the Association, and has been succeeded by Mr. J. S. Greenhalgh.

Award for Clean Air Film

The results of the 1964 British Medical Association International Film Competition have just been announced. In Category B of the competition a Silver Award was presented to "It Takes Your Breath Away".

One of the advantages of this award is the good publicity the film will receive in more specialised quarters. Copies of the film will be available from the B.M.A. Film Library.

The film, which has previously been reviewed in this journal, was given its premiere at the Harrogate Conference in October last. Local authority members are using it extensively.

Solid Fuel Heating for Home.—The National Coal Board and Coal Utilization Council, in conjunction with the Hotel and Catering Trades' Benevolent Association, held a reception in Wimbledon on March 2, to mark the opening by Lord Robens of the second home for the pensioners of the Association. The home was open for inspection, and in the grounds was staged a temporary exhibition, open to the public, of modern solid fuel burning appliances. The home is centrally heated by coal in an automatically-stoked boiler with mechanical transport of the fuel from store to boiler.

Bar to Coal and Oil

Oil and coal interests—already caught in the increasing federal drive against air pollution—are bracing for a new blow.

The Public Health Service has drawn up regulations barring the use of oil or coal to heat new, small government buildings, particularly those to be built in urban areas. Because of heating expense, large new federal buildings would still use oil and coal but higher than usual smoke stacks would be required. The regulation is being studied in the Budget Bureau, and health officials expect a favourable decision shortly. Industry sources do not think that much actual coal or oil would be affected, but fear the order could lead to more widespread restrictions in the future. —*Business Week, New York, May 1, 1965.*

Smoke Control Evasion

Forty-seven householders living in the three smokeless zones so far set up at Wigan were honest enough to admit during a full scale investigation carried out by the Public Health Department they had never used smokeless fuels, says the Town Clerk, Mr. Allan Royle, in a Smoke Control Survey Report.—"*Evening News*", Bolton, February 26, 1965.

“Thou Hast Thy Smoke, Too”

A Close Look at Smoke — in 1844

IN a little-known book, *The Claims of Labour: An Essay on the Duty of the Employers to the Employees*, by Sir Arthur Helps, published in London in 1844, there is a remarkably perceptive discussion on the smoke problem of that time, which we reprint below in full. We are indebted to Mr. P. M. Jackson, of the Department of Sociology, University of Hull, for having discovered and sent us this historically valuable excerpt. The quotations included by the author—such as that by the famous Count Rumford—have their own interest, too.

The last paragraph is particularly worth reading, and we have italicized Sir Arthur's final, prophetic words.

I have heard it said [writes the author], and thought it a far-seeing remark, that one of the greatest benefits which could be conferred on manufacturing towns, would be to purify them from smoke, on the ground that the wealthier classes would then have less objection to reside in their vicinity: and, especially, that those who constitute the natural aristocracy of the place, would not be so much tempted to remove themselves from the spot where their fortunes had grown up.

Dr. Cooke Taylor, in his letters to the Archbishop of Dublin, speaking of the parts of Manchester which “have been abandoned to the poorest grade of all,” says,

“Your Grace is aware that to some extent Dublin is similarly divided into the city of the rich and the city of the poor; but I know that many respectable and wealthy manufacturers reside in the liberties of Dublin, while the smoke-nuisance drives every body from the township of Manchester who can possibly find means of renting a house elsewhere.”

Now is the doing away of this smoke

a sort of chimerical and Quixotic undertaking? Not in the least. The experiments appear to be decisive upon this point; and had there been a reasonable care for the health, beauty, and cleanliness of the towns where their work is carried on, the manufacturers would long ago have contrived, I believe, that there should be no such thing as opaque smoke issuing from their chimneys. Count Rumford says in his essays,

“I never view from a distance, as I come into town, this black cloud which hangs over London without wishing to be able to compute the immense number of chaldrons of coals of which it is composed; for could this be ascertained, I am persuaded so striking a fact would awaken the curiosity, and excite the astonishment, of all ranks of the inhabitants, and *perhaps* turn their minds to an object of economy to which they have hitherto paid little attention.”

The essay from which this extract is made was published in 1796: what would the Count say now? I believe the calculation which he was thinking of has been made. At any rate a near approximation might be; for I am told, on scientific authority, that “the actual quantity of smoke hanging any day over London is the fourth part of the fuel consumed on that day.” Mr. Cubitt, the great builder, in an examination before the House of Commons, quoted by the Sanitary Report, thus expresses himself on this subject:

“With respect to manufactories, here are a great number driven by competition to work in the cheapest way they can. A man puts up a steam-engine, and sends out an immense quantity of smoke; perhaps he creates a great deal of foul and bad gas; that is all let loose. Where his returns are £1,000 a month, if he would spend £5

a month more, he would make that completely harmless; but he says, 'I am not bound to do that,' and therefore he works as cheaply as he can, and the public suffer to an extent beyond all calculation."

To show how little loss is to be apprehended from regulations abating this nuisance, the Sanitary Report cites the authority of

"Mr. Ewart, the Inspector of Machinery to the Admiralty, residing at Her Majesty's Dock-yard at Woolwich, where the chimney of the manufactory under his immediate superintendence, regulated according to his directions, offers an example of the little smoke that need be occasioned from steam-engine furnaces if care be exercised. He states that no peculiar machinery is used; the stoker or fire-keeper is only required to exercise care in not throwing on too much coal at once, and to open the furnace door in such slight degree as to admit occasionally the small proportion of atmospheric air requisite to effect complete combustion. Mr. Ewart also states that if the fire be properly managed, there will be a saving of fuel. The extent of smoke denotes the extent to which the combustion is incomplete. The chimney belonging to the manufactory of Mr. Peter Fairbairn, engineer at Leeds, also presents an example and a contrast to the chimneys of nearly all the other manufactories which overcast that town. On each side of it is a chimney belonging to another manufactory, pouring out dense clouds of smoke; whilst the chimney at Mr. Fairbairn's manufactory presents the appearance of no greater quantity of smoke than of some private houses. Mr. Fairbairn stated, in answer to inquiries upon this subject, that he uses what is called Stanley's feeding machinery, which graduates the supply of coal so as to produce nearly complete combustion. After the fire is once lighted, little remains to the ignorance or the carelessness of the stoker. Mr. Fairbairn also states that his consumption of fuel in his steam-engine furnaces, in comparison with that of his immediate neighbours, is proportionately less. The engine belonging to the cotton-mills of Mr. Thomas Ashton, of Hyde, near Stockport, affords to the people of that town an example of the extent

to which, by a little care, they might be relieved of the thick cloud of smoke by which the district is oppressed.

"At a meeting of manufacturers and others, held at Leeds, for the suppression of the nuisance of the smoke of furnaces, and to discuss the various plans for abating it, the resolution was unanimously adopted, 'That in the opinion of this meeting the smoke arising from steam-engine fires and furnaces can be consumed, and that, too, without injury to the boilers, and with a saving of fuel.' Notice of legal proceedings being given against Messrs. Meux, the brewers in London, for a nuisance arising from the chimneys of two furnaces, they found that by using anthracite coal they abated the nuisance to the neighbourhood, and saved £200 per annum. The West Middlesex Water Company, by diminishing the smoke of their furnaces saved £1,000 per annum."

But putting aside the consideration of any pecuniary benefit to be gained, I think it would not be unreasonable to say that no considerate owner of a factory would wait for public regulations in this matter, but would, himself, be anxious to prevent his occupation from being injurious to his neighbours. In a manufacturing town, a man may find some excuse, though a most futile one, in the consideration that it would be of no use for him alone to consume his smoke, when there are hundreds of others over whom he has no influence to persuade them to follow his example. But you sometimes see one of these hateful chimneys in a neighbourhood generally free from them, and it does not seem to occur to the owner that he is doing anything wrong, provided he is legally secure. Probably he gives away in the course of the year such a sum as would put up an apparatus which would modify, if not altogether remove, the smoke. Let him not think that charity consists only in giving away something: I doubt whether he can find any work of benevolence more useful to his neighbourhood and to society in general, than putting a stop to this nuisance of his own creation. I am not inclined to rest my case against it on

the ground of health alone; though I believe, with the Sanitary Commissioners, that it would be found much more injurious than is generally imagined. When you find that flowers and shrubs will not endure a certain atmosphere, it is a very significant hint to the human creature to remove out of that neighbourhood. But, putting aside the question of health, this nuisance of smoke may be condemned simply on the ground of the waste and injury which it occasions. And what is to be said on the other side? What can any man allege in its favour? Our ancestors, who had glimmerings occasionally, held that

“Si homme fait candells deins un vill, per qui il cause un noysom sent al inhabitants, uncore ceo nest ascun nusans car le needfulness de eux dispensera ove le noisomness del smell.” (2 Rolls Abr. 139.)

This is quoted in a grave public document (the Sanitary Report): had we met with it elsewhere, we might have concluded that it came from that chronicle in which Mr. Sidney Smith found the account which he gives of the meeting of the clergy at Dordrecht. I quote it, however, to show how wisely our ancestors directed their attention in this instance. If they had been begrimed with smoke as we are, and, upon inquiry, had found that there was no “needfulness” to back the “noisomness,” it is probable they would have dealt with it in their most summary manner. Whereas I fear that Mr. Mackinnon’s “Smoke Prohibition” Bill, amidst the hubbub of legislation, has great difficulty in finding the attention which it really deserves. The truth is, this smoke nuisance is one of the most curious instances how little pains men will take to rid themselves from evils which attack them only indirectly. If the pecuniary injury done to the inhabitants of great towns by smoke could only be put in the form of a smoke rate, what unwearied agitation there would be against it. But surely we ought not to view with less hostility, because of its silent noxiousness, a thing which injures the health of our

children, if not of people of all ages, disfigures our public buildings, creates uncleanness and gives an excuse for it, affects in some degree the spirits of all persons who live under it, renders manufacturing towns less welcome places of residence for the higher classes (which is what brings it in connexion with the subject of this Essay); and thereby, and in many other ways, is peculiarly injurious to the labouring population. *If these pages should survive to any future age, it will excite a smile in some curious reader to see how urgent I have endeavoured to be about a matter which will then be so obvious—“What strange barbarous times they must have been,” he will say to himself: “wisdom of our ancestors, forsooth!” “Far-off reader,” if there be such an entity, “do not presume: thou hast thy smoke too.”*

ALGERIA — U.K.

Methane Importation Scheme

Inauguration by the Minister of Power

The successful beginning of the Gas Council’s scheme for the importation of natural gas (methane) to Britain was marked on April 14, 1965, by the formal inauguration of the scheme in general, and the Canvey Island terminal in particular, by the Minister of Power, the Rt. Hon. Frederick Lee, M.P. The ceremony took place before a very large gathering not only of press representatives, but guests of the Gas Council, from the Algerian Government, the Diplomatic Corps, the British Government and representatives of many other British and foreign interests.

Sir Henry Jones, K.B.E., Chairman of the Gas Council in introducing the Minister, said that the scheme, the first of its kind in the world, required a great deal of negotiation and discussion before it was finally agreed. It was a truly international project which might well serve as an



The Minister of Power, seated, in the control room at Canvey Island, with Sir Henry Jones

example for others. After paying a tribute to all those—in particular the British Government—who had enabled the scheme to come into being, Sir Henry said: “The gas industry has changed a lot over the past few years and this methane scheme is part of that change. If the modernization of Britain, in which I am sure all of us believe, is to make really effective progress, hard economic facts are bound to count perhaps more than they have done in our past history. More change will be necessary, and the gas industry, which has already demonstrated that you do not have to be young to be adaptable, is ready to meet it”.

The Minister of Power said that “we must be impressed by the combination of calculation and daring with which the Gas Council embraced this project. It has more than a touch of science fiction about it and in the early days it looked a very “long shot”. He referred to the brochure “Natural Gas for Britain”

which describes how modern technology has been used to underwrite not only the reliability of the operation, but also the safety of plant, ships, crews, and finally of the farmers harvesting those cornfields”. Mr. Lee further mentioned the international character of the occasion and the association of the Gas Council with Constock (Union Stockyard and Transit Company of Chicago), the North Thames Gas Board and Conch International Methane Ltd. “Shell, it seems to me” said the Minister, “are always with us, although in other respects not like the poor”.

The most important international aspect was the establishment of the entirely new economic link between Britain and Algeria and on behalf of Her Majesty’s Government, the Minister most cordially welcomed it. He concluded by congratulating the whole Gas Council on this corporate triumph and then unveiled the commemorative plaque to mark the inauguration of the scheme.

"Air Knows no Frontiers"

INTERNATIONAL SECTION

France

NEW REPORT ON THE PARIS ANTI-POLLUTION COMMITTEE

THE second report of the French Committee of Technical Action against atmospheric pollution (C.A.T.P.A.) for 1963/1964 has arrived at the Society's office in the form of a beautifully produced booklet, causing admiration not untinged with envy at its lavish presentation. We are glad to be able to reproduce two of the excellent photographs which, together with coloured graphs and drawings, add to the visual interest of this publication. The contents of the report are no less worthy of interest since they analyse the results of two years' of studies undertaken by the technical study centre (C.I.T.E.P.A.; financed by interested industries and a government grant) in the fight against atmospheric pollution, particularly from domestic sources, in the experimental zones of Paris.

As a result of the Centre's work, it has been possible to fix the criteria for formulating the first French clean air decrees (published August 11, 1964) for which provision was made in the Act of 1961. Based on new methods of measurement and on recent technical data, these decrees have been applied to Paris only, in the hope that the industries and public services concerned with clean air would be able to judge, from the results obtained there, future possibilities of applying them to the rest of the country. The decrees were drawn up after a series of meetings at which both the technical and public service experts co-operated. The report emphasizes however, that any regulations will prove useless without a con-



One of the striking illustrations—here much reduced—from the report on Paris air pollution here reviewed

structive effort being made to convince the fuel user to apply the recommended methods of combustion.

Study of the French Capital

Does Paris merit its new title given by the Minister of Public Health of "a special protection zone"? To answer this question, the report



Another Paris view, from the C.A.T.P.A. report

presents a detailed survey of the city, its inhabitants and their living conditions,—the statistics being enlivened with apt quotations from French literature.

Full of contrasts, Paris appears to some a city of light and beauty; to others a satanic place with tainted air full of noise and agitation. From the wealth of information provided, the amazing fact emerges that Paris is the most densely populated city of the world, with 32,300 inhabitants per square kilometre, against 16,800 in Tokyo and a mere 10,300 in London. Thus on the average each Parisian has just over one square metre of space to breathe from, which is quite unoccupied by buildings, traffic, etc. In 1962, 15 per cent of their housing had no water, 45 per cent no conveniences and 66 per cent no bathrooms.

Sources of Pollution

The four principal sources of pollution in Paris are given as: (a) organic and mineral gases vapours and dusts; (b) motor vehicle pollution; (c) industrial gases and dusts (industry consuming only 15 per cent of total energy); (d) heating from domestic, commercial, administrative etc. sources. The last important source of pollution was the main subject of the committee's study, most detailed information being obtained in the 11th and 16th "arrondissements" of Paris which were designated as smokeless zones in 1961. It has been found that the chic district of Passy is more polluted than the working class area of Bastille because of higher standards of comfort in heating. Consumption per head in Passy (16th) is 10,000 therms yearly against 2,750 therms in Bastille (11th), where fewer therms are

used for space heating, hot water etc. Figures for 1963 show coal consumption to be highest, followed by fuel oil and gas.

Amounts of pollution

After evaluating the amount of pollutants emitted by various fuels and discussing the part of the favourable Paris climate on the dispersion of pollutants, the report gives results of measurement of pollution undertaken by the City Laboratory. Between 1959 and 1963 there has been an overall decrease in smoke and SO_2 concentrations which is not regarded in any way conclusive; very marked differences however exist between different localities, most SO_2 pollution being present where most fuel is consumed.

Since similar measuring equipment is used both in Paris and London, it is possible to compare the pollution of these two cities—which makes melancholy reading for the English. Although London is less densely populated, its pollution is almost double that of Paris both as far as SO_2 and smoke are concerned. The reasons advanced here are: the climate, quality of fuel, heating appliances and the English love of the open fire.

The Future

In spite of plans for stabilizing the numbers of population in Paris, decentralization of industry and other measures, no hope is held out by the report of any lessening of pollution in the future. Because of higher standards of comfort demanded in new buildings, it is in fact feared that there will be a 5 per cent increase in pollution every year. A strong plea is made for more trees and parks in the centre and around the city in order to minimize this and combat the effects before it is too late. It is concluded that Paris does in fact deserve to be nominated as a "special protection zone" in which the clean air regulations of 1961 should be applied.

Decrees

The final sections of the report are devoted to a detailed description of the new regulations, the adopted standards of which are more stringent than in other countries. The principal features are as follows: All visible smoke is prohibited (smoke being defined by a Bacharach indicator which has to be below 6 for all fuels) and dust emission must be below 0.6 grams per "thermie" (nearly 4,000 Btu) produced. Fuels containing more than 2 grams per thermie of sulphur are prohibited, and for small and medium powered boilers with an output below 350 or 1,000 thermies according to zones, only the domestic fuel with 0.5 per cent of sulphur is authorized.

The Committee believes that as a result of these regulations, there will be a 25 per cent reduction in sulphur emission in Paris zone No. 1 (covering 23 square kilometres) and for the whole of the city a 20 per cent reduction can be estimated. A further estimate is made for smoke pollution: since highly volatile coals are prohibited from being used by industry and domestic consumer, an overall 25 per cent reduction of smoke is expected as well.

O.E.C.D.

AIR POLLUTION MEASUREMENT

The organization for Economic Co-operation and Development (of which the United Kingdom is one of the 21 members) has, through its Committee for Scientific Research, just published an important report on "Methods of Measuring Air Pollution". This is the outcome of the studies of a Working Party set up in 1957. The first chairman was Dr. E. T. Wilkins, and, since 1959, Dr. S. R. Craxford.

The report is divided into six chapters, as follows: 1. General Statement on the working party, its terms of reference and testing methods.

2. Report of the sub-group on "Smoke". 3. Report of the sub-group on Sulphur Dioxide. 4. Report of the sub-group on Sulphur Trioxide. 5. Report of the sub-group on Measurement of Hydrocarbons. 6. Determination of fluorides.

It is hoped that the recommendations made in the report will be generally adopted internationally, as it is only through the use of the same methods and techniques that pollution measurements in one country can be usefully compared with others.

The report, of 94 pages, is available in English or French, and may be ordered direct from the Organization for Economic Co-operation and Development, 2, rue Andre Pascal, Paris, 16 eme. The price is 7s. 6d., or U.S. \$1.25; F.5; Sw.F. 5; DM 4.20.

W.H.O.

HEALTH AND PLANNING

Environmental Health Aspects of Metropolitan Planning and Development. Report of a WHO Expert Committee. World Health Organization Technical Report Series No. 297. pp. 66. Price 6s. 8d., U.S. \$1.25, Sw.F. 4. Also published in French and Spanish. Available in U.K. through H.M. Stationery Office.

The rapid growth of urban areas is perhaps the greatest single problem facing the second half of the twentieth century. The encroachment on space, the potential spread of disease, and the threats to health from overcrowding, noise, air pollution and the degradation of man's environment all demand effective measures of control and the careful planning of future urban development.

This report surveys the problems and requirements of urban life, and discusses the measures necessary to achieve the aim of a healthful environment. It is emphasized that the approach should be broad, in order to strike a balance between economic, social, physical, and psychological factors. Any plan for metropolitan

development must take into account specific problems such as water supplies and drainage, waste disposal, air pollution, the hazards of radiation and disease, the control of traffic, noise and vibration, the siting of buildings, and the provision of open space. Attention is drawn to the need for effective communication and collaboration between all the agencies involved in metropolitan planning, and for the constant review of programmes in the light of changing conditions. Administrative action must be co-ordinated under a central authority. Officials and others concerned with planning should be given appropriate training to enable them to appreciate the principles of environmental health.

On air pollution the report points out that technical, legal administrative and educational measures are being taken for prevention and control. It considers only the help that planning can provide, and urges that sound planning in metropolitan areas is essential. Examples are given of such planning aspects:

- (a) The siting of new towns should be undertaken only after a thorough study of local topography and meteorology.
- (b) New industries using materials or processes likely to produce air contaminants should be so located as to minimize the effects of air pollution.
- (c) Satellite (dormitory) towns should restrict the use of pollution producing fuels.
- (d) Provision should be made for green belts and open spaces to facilitate the dilution and dispersion of unavoidable pollution.
- (e) Greater use should be made of hydro-electric and atomic power and of natural gas for industrial processes and domestic purposes, thereby reducing the pollution resulting from the use of conventional fossil fuels.
- (f) Greater use should be made of central plants for the provision of both heat and hot water for entire districts.

(g) As motor transport is a major source of pollution, traffic planning can materially affect the level of pollution in residential areas.

The British member of the Committee that prepared this report was Mr. P. E. A. Johnson-Marshall, Lecturer in Town Planning, Department of Architecture, University of Edinburgh.

U.S.A.

SULPHUR OXIDES BIBLIOGRAPHY

The U.S. Department of Health, Education and Welfare, Public Health Division, has published an important and comprehensive *Bibliography with Abstracts on Sulphur Oxides and other Sulphur Compounds*. The work contains 994 abstracts, together with a title index, an index to authors, and a geographic location index. It covers papers and publication to 1963-4.

The abstracts are well classified under 13 sectional headings, and the compiler, Anna Grossman Cooper, Staff Assistant, Division of Air Pollution, has contributed a most interesting introduction on the history

of sulphur and its uses by man.

The 384 quarto volume is on sale from the U.S. Government Printing Office, Washington, D.C., 20402, at a price of \$2.25.

OTHER U.S. NEWS

Air pollution complaints in New York City jumped by 25 per cent during 1964, to a record total of 24,408 for the year, according to the news letter of the City's Air Pollution Control Department. Commissioner Benline attributes that to the rise of a growing public concern over the dangers of air pollution, in part stimulated by the publicity being given to the problem.

The 1965 Convention of the Air Pollution Control Association is being held from June 20 to 24 in Toronto. The Technical Programme Chairman is Dr. Morris Katz of the Occupational Health Division, Canadian Federal Government.

In co-operation with the U.S. Public Health Service, the A.P.C.A. has published a new edition of their annual directory of Governmental Air Pollution Agencies. Federal, State and City officials are listed, for both the U.S. and Canada.



The cover picture of a new educational or propaganda booklet "Air Pollution and Respiratory Disease" published by the Public Health Service, U.S. Dept. of Health Education and Welfare



James Fitzpatrick (l.), Director of the Chicago Dept. of Air Pollution Control, and Prof. E. R. Hendrikson, Florida Univ., President of the Air Pollution Control Association, photographed during a recent visit to the Society's offices

Chicago—We have received the annual report, for 1963, of the City of Chicago Department of Air Pollution Control. Chicago is able to claim to have led the nation in its fight against polluted air with its pioneer Smoke Abatement Ordinance of 1881. Today the department with James V. Fitzpatrick as its Director (see photograph above) has a staff of 69, and an expenditure for the year of \$590,972. Against this it collected \$441,136 in annual inspection fees and \$44,136 in plan and permit fees. The intensive survey programme now in operation was described by Mr. Fitzpatrick in the paper he presented to the Düsseldorf conference in April last, an abstract of which appears on another page.

Sensitive Pines—The U.S. Forest Service is attempting to develop pine trees that will sense polluted air and help to identify toxic substances in the air. When exposed to even small amounts of pollutants, such as fluorine, sulphur dioxide, and ozone, some of the test pines will change colour, wither or die. Some of the seedlings may also be selective, reacting to one pollutant and not to others.

Australia

SYDNEY CONFERENCE

It is announced by the New South Wales Department of Public Health

that a Clean Air Conference is to be held in Sydney from August 17 to 20, 1965. Papers for the conference will be welcomed, and further details can be obtained from the Conference Secretary, Dr. J. L. Sullivan, N.S.W. Dept. of Health, P.O. Box 31, George Street North Post Office, Sydney.

Sweden

Research on Pollution

It is reported that Sweden is to set up a new research institute to study pollution of the air, of water and by insecticides. On air pollution, that from motor traffic is causing concern, as is the smoke and discharge into rivers from wood-pulp mills up-country, both of which are reported to be destroying certain types of moss and lichen. This has seriously affected elk and reindeer, which depend on this herbage for their spring grazing. (*From Irish Independent*, 13.4.65)

Japan

First Smog Warning

The Metropolitan Public Nuisance Department issued the first smog warnings Friday afternoon since the smog warning system was established in the metropolis on January 11.

The warnings were issued at 3 p.m. when the sulfurous acid gas content reached 0.2 parts per million at 2.30 p.m. and the wind velocity dropped to 2.5 meters per second.

The warnings were lifted four hours later.—*Japan Times, Tokyo*, February 6, 1965.

Argentina

International Conference

The Asocacion Argentina Contra la Contaminacion del Aire is organizing an international air pollution conference in Buenos Aires in November this year. Technical and scientific papers are invited. Further details are available from the Society.

Air Pollution and the Public Health

by

P. J. Lawther, M.B., B.S., F.R.C.P.

From a Lecture to the Royal Society of Arts

THIS lecture by Dr. Lawther, Director of the Air Pollution Research Unit, Medical Research Council, was read at a meeting of the Royal Society of Arts on March 24. The lecture will be published in full in due course in the *Journal* of the Society, but we are able to print the following excerpts.

After beginning with a survey of the pollutants that cause concern, Dr. Lawther emphasized that estimates of the quantities of pollutants emitted did not tell the whole story. He continued:

Indeed they may seriously mislead those who seek to display an association between pollution and disease. It matters nought to the clinician that so many thousand tons of SO_2 are emitted from this power station or that factory if none reaches the ground to be breathed by man. Figures of fuel consumption and pollution discharged are of course of value to the economist, engineer and meteorologist and to the clinician in that from them he can assess trends, but measurements of concentrations at "lung level" are what interests us here. And when such measurements are studied carefully one finds that the centres of large industrial towns are not now necessarily the dirtiest places but that higher concentrations of pollution occur frequently in the closely built-up suburbs of towns of any size. The National Survey of Air Pollution which has been organized by the D.S.I.R. is producing results of inestimable value to the epidemiologist.

Temperature Inversion Episodes

After discussing the effects of pollutant upon the lungs of the individual, the paper continued:

No one doubts that the severe pollution which accumulates during temperature inversions can kill people. During these episodes death rates rise, the excess mortality occurring among premature infants, very old people and those already crippled by disease of the respiratory and cardiac systems. It would seem reasonable to believe that the irritation by severe pollution constitutes a final intolerable stress to inadequate or impaired organisms. Wheezing and increased shortness of breath are common symptoms in such times among such people and experiments are designed to try to identify the pollutants responsible for this clinical picture which may be merely a manifestation of increased airway resistance. In the laboratory normal adult volunteers breathe low concentrations of pollutants found in the air during episodes of high pollution and delicate methods of measuring the resistance of the airways are used to detect any effect of the experimental inhalations. Experiments done in laboratories all over the world have failed to produce significant and reproducible increases in airway resistance following the inhalation of sulphur dioxide or sulphuric acid in the concentrations found in the most heavily polluted town air, and research is therefore directed to the investigation of the effect of mixtures of pollutants

particulate and gaseous. There is evidence from work on guinea pigs that the effect of comparatively low concentrations of sulphur dioxide can be enhanced by the addition of salt aerosols but experiments with such mixture on humans have so far yielded negative results. The difficulties besetting the worker in this field can be displayed by giving an example of our recent experiments on ourselves. Having failed to produce significant increases in airway resistance by inhaling realistic concentrations of sulphur dioxide we turned to sulphuric acid mists. There are many ways of producing a mist containing say 1 mgm of acid per cubic meter of air; the acid can be in a few big drops or many tiny ones and the size of both varieties of drop may be altered by altering the humidity of the air. But inhalation of none of these variants produced the effects we sought and we thought our failure was due to the fact that when the tiny acid droplets are inhaled they meet the warm moist air in the lung, whereupon they grow rapidly and become very dilute by the time they impact on the lining of the airways. There is evidence from our work that some particles are porous and contain acid on their interior surfaces. This structure might protect the acid from rapid dilution before impaction and so another huge round of carefully controlled experiments is in progress in which aerosols of minute porous carbon particles soaked in sulphuric acid and suspended in SO_2 -containing air are breathed. The concentrations used are all "safe" and aimed to produce only transient easily reversible effects but so far even these have eluded us. But it is merely a matter of keep trying; some combinations of urban pollutants make some people wheeze and cough but the possible combinations, and the variability of time of response, are so legion that no early answer can be expected. Naturally, experiments with coal smoke generated in the laboratory are being done and may help to provide answers in a shorter time.

Bronchitis

Later, discussing bronchitis and lung cancer, Dr. Lawther said:

There is more bronchitis in Britain than in other countries and more in towns than in rural areas. Air pollution is suspected of being responsible for the differences. But, like the problems already discussed, this is complex. There is good evidence, derived from thorough surveys of populations, that many other factors, among which smoking is prominent, are involved in the production of bronchitis. However, it seems that an "urban factor" remains even when allowance is made for smoking, occupation, social class, overcrowding and many other undesirable features of life in towns. Are we justified in assuming that the urban factor is air pollution? To consider this question we need to know something of the pathology and evolution of the disease. Chronic bronchitis is characterized first by a proliferation and hypertrophy of the mucus secreting elements in the airways presumably in response to inhaled irritants. This phase, which is almost certainly reversible, is manifest clinically by chronic coughing to expel the excessive mucus. Later infection supervenes; the sputum becomes purulent and this is frequently followed by destruction of lung substance which leads to emphysema. Cigarette smoke is certainly a powerful enough irritant to produce the early changes which frequently regress on stopping smoking. Are any single pollutants responsible for the change? The temptation to incriminate SO_2 is strong but all the evidence is against such a simple hypothesis. The gas is present in minute amounts (it has never reached concentrations above two parts per million where 5 p.p.m. is regarded as perfectly safe for industrial exposures), and if the gas were the irritant responsible one would expect to find a gross excess of "simple" chronic bronchitis in chemical industry. There is an excess but it is not gross. The mechanism is likely to be more subtle and may involve the disturbance

of the physical nature of the film of mucus by some of the many organic compounds contained in smoke. The infective and destructive stage of the disease is more serious and is irreversible. The evidence that this stage, with its increasing disability, is related to air pollution is strong. One would wish to discover a factor which would favour the persistence of infection. Paralysis of ciliary activity can be induced by nicotine and sulphur dioxide but the doses needed in the latter case greatly exceed those found in air. The thick blanket of mucus produced by our "irritant" factor does of course hamper the cleansing of the airways and this explanation might suffice. Further experiments are being done to see if smoke and other pollutants might even favour the growth of certain bacteria commonly found in the sputum of patients with chronic bronchitis. The "urban factor" in the genesis of the disease cannot be simple and may even yet be seen to be unrelated to pollution, though smoke, happily diminishing, must remain highly suspect.

Lung Cancer

The problem of lung cancer looks, on superficial examination, to be almost identical. The disease is more commonly found in towns than in the country and town air contains many substances which are known to be capable of producing cancer. Many people therefore make the simple assumption that lung cancer is caused by the polycyclic hydrocarbons or other carcinogens found in town air. But this is a naïve view; it can only be held by ignoring much conflicting evidence. What we are faced with is a dramatic, and indeed fearsome, rise in the prevalence of this dread disease which is occurring over a period when pollution by carcinogenic hydrocarbons has been declining. The rise in lung cancer mortality is seen in countries which have negligible air pollution. (Finland has the second highest lung cancer rate in the world—

we hold first place—and yet there is but little smoke.) All the evidence adduced from large studies all over the world points to the emergence of a new factor, at about the turn of the century in this country, which has acted in an increasing proportion of the population to give a slow rising curve in the prevalence of lung cancer. In two documents the evidence is reviewed in a manner which has already made them classics in the literature on public health—the Royal College of Physicians report on "Smoking and Health" and the U.S. Surgeon General's report "Smoking and Health". No one can read these works and come away unconvinced that the overwhelmingly important cause of lung cancer is the smoking of cigarettes.

But of course there remains enough room for an "urban factor". Much work, experimental and epidemiological, is in progress to identify this factor and its relation to air pollution. Of course, there does not have to be one cause of lung cancer or chronic bronchitis—not even one "urban factor" but throughout all the maze of technical complexities of this subject it is prudent to remember that few people working in this field would deny the rôle played by cigarettes and that the Finnish people, for long heavy cigarette smokers, can get their lung cancer without air pollution.

Motor Exhausts

A brief review of the problem of motor vehicle exhausts followed, and the paper continued:

The motor vehicle is a common scapegoat for the guilt attached to the cigarette. Yet there is no evidence to blame motor exhaust for the rise in lung cancer. It is true that their increased use has been contemporaneous with the rise in lung cancer but since it usually takes a period of roughly twenty years exposure to a carcinogen to produce the cancer this evidence is poor, and at best incomplete since it could only explain the latter day rise. The exhaust products of petrol engines

and maladjusted diesel engines do sometimes contain carcinogenic hydrocarbons but the concentrations are minute in comparison to those found in coal smoke. Again, if motor exhaust were the cause of this rise in lung cancer the disease would have appeared in excess among those who by virtue of their occupation have been exposed to high concentrations of exhaust products. No such evidence has yet been published. This is a reason for rejoicing, yet many appear sad to learn that motor exhaust does not seem to cause cancer. This attitude in itself merits investigation.

But petrol engines, unlike the properly run diesel, emit carbon monoxide and this is the only pollutant which we have found in city air in concentrations which would not be tolerated in industry. On the pavement in Oxford Circus we once found three and a half times the acceptable Maximum Allowable Industrial Concentration. Carbon monoxide is an odourless asphyxiant gas about which much is known. It is commonly used, in coal gas and from a car, to commit suicide. The haemoglobin of the blood seizes it avidly in preference to oxygen and there is a growing body of evidence that even low concentrations in the blood, insufficient to cause symptoms, can lead to impaired judgement. This work is of obvious relevance to road safety.

Room for Common Sense

In conclusion, Dr. Lawther referred to the Clean Air Act and ended with some admirable *dicta*:

The Clean Air Act is a good instrument in that it reduces what is reducible and unnecessary without waiting for the results of medical research. It recognizes that the complete abatement of certain pollutants such as sulphur dioxide at present poses problems which are insoluble in economic terms. This does not mean that we must tolerate unlimited SO_2 or any other pollutant but that we must be ready to produce sound evidence to justify the high cost of

reducing their concentration to carefully specified levels which we believe unequivocally to be wholly innocuous.

But there need be no mystery about certain aspects of air pollution. There are data relating to past experience, and in planning new towns and developing the centres of old ones there should be little difficulty in ensuring that we do not submit ourselves to more pollution than past experience shows to be dangerous. Power stations should have high chimneys; district heating is a good system; gas is an excellent smokeless fuel; the use of well-maintained diesel public service vehicles avoids the contamination of city streets by carbon monoxide; cigarette smoking constitutes the most intense and dangerous personal form of air pollution which, happily, is easily abolished by the individual; open grates are antique and filthy contrivances for the inefficient use of valuable coal. There is indeed plenty of opportunity for reform and the application of common sense whilst we labour to display the more subtle effects of pollution of the air we breathe.

TV Set Presentation

Thanks to one of its own pupils, the Bingley County Secondary School has been presented with a 23 inch TV set. The pupil is 13 year old Susan Robinson, who won the first prize in the "Design a Television Storyboard" competition on the subject of clean air organized by the N.S.C.A. in conjunction with its conference and exhibition at Harrogate last October.

The set was handed over to the school by Mr. E. J. Winfield, Senior Public Health Inspector of Castleford and a member of the N.S.C.A. Executive Council. This took place during the school's annual prize-giving ceremony on April 13, when the guest of honour was the international cricketer, Sir Learie Constantine.

The Programme for Eastbourne

The programme for the Society's conference at Eastbourne from October 26 to 29 next, has now been almost completed. Briefly, the proceedings will be as follows:

Tuesday (26th). *Morning:* Civic welcome; opening of conference by the Parliamentary Secretary, Ministry of Housing and Local Government, Mr. R. Mellish, M.P.; Presidential Address by Sir Alan Wilson, F.R.S. *Afternoon:* Domestic Clean Air Session. (1) Papers on smoke control area successes, by J. W. Batey (Sheffield), G. O. Allen (Scunthorpe), and J. Richards (Manchester). (2) Papers by E. Otty (N.C.B.), and W. H. Bourne (Nat. Fed. Coke Distributors Asscns.), on solid smokeless fuels supply and distribution. Discussion to be opened by Sir John Charrington.

Wednesday. *Morning:* Paper by A. J. Wicken (Health Surveys Unit, AGB Research Ltd.), on the Eston Bronchitis Survey; Paper by Dr. Betz (Kavag), on Odour Control by Catalytic Combustion; and a paper by Mr. E. Coucke on Belgian experience in road vehicle pollution control. *Afternoon:* Visits (numbers limited) to the Dungeness Nuclear Power Station, Reeds Paper Mill, and a cement works.

Thursday. *Morning:* "New Horizons in Domestic Heating". Four papers: Dr. W. Reid (N.C.B.), on solid fuel, with special reference to district heating; H. R. Brewster (Shell-Mex and BP), on Oil, with special reference to district heating and centralized supply; R. N. Bruce (S.E. Gas Board), on the Future for Gas; and C. T. Melling (C.E.G.B.), on the Future for Off-Peak Electricity. *Afternoon:* Industrial Problems: paper by J. M.

Hodgson on the choice of equipment for dust emission prevention; and paper by S. C. Beaumont (Birmingham), on chimney heights—progress and problems since the Memorandum.

Friday. *Morning:* Unresolved problems in air pollution. Paper by F. E. Ireland (Chief Alkali Inspector), and Report on behalf of the Parliamentary and Local Government Committee of the N.S.C.A., to be presented by its Chairman, E. M. Birtwisle.

On the social side there will be a luncheon open to all delegates on the Thursday, and a Theatre Party by invitation of the Mayor of Eastbourne on the same evening. There will also be a golf tournament for those who are interested, visits of interest for delegates' ladies, and of course the usual "get together" on the Monday evening prior to the opening of the conference.

Dungeness Nuclear Power Station

Eastbourne Conference Visit

Following the Address by Lord Sherfield to the Harrogate Conference last year and with the prospect of a party of delegates to the 1965 Conference visiting Dungeness Nuclear Power Station it is useful to be reminded that to produce electricity on a commercial basis steam-driven turbo-alternators are used and technological advancement is mainly in the size of turbo-alternators and the way in which steam is produced. It is the latter which is the main variable between conventional and nuclear stations. In the nuclear stations heat is generated in the reactor core by nuclear fission. This is achieved fundamentally by the proximity of natural uranium metal with graphite in definite proportions. The process of fission being controllable by the insertion or removal of steel control rods which have the effect of counter-acting or accelerating the rate of

fission within the fuel. The heat generated in this way is conducted to boilers by carbon dioxide under pressure and used to raise steam which is fed to turbines coupled to alternators which generate electricity.

Dungeness Power Station is to operate as outlined above and is the fifth station of its type in the Nuclear Programme. The Station is situated on the coast at Dungeness Point, 21 miles south of Ashford, Kent. The design output is 550,000 kilowatts which is generated by four 142,500 kilowatt turbo-alternators. There are two reactors each rated at 840 million watts (heat) and contained in steel spheres of approximately 63 feet diameter, the reactor core being built up of graphite bricks into a 24 sided prism. The core has 4,000 channels through it in the vertical plane which are to hold the uranium fuel elements and steel control rods. The reactor vessel is contained within a concrete building which is circular in plan and called the "biological shield". Cooling air is circulated between the reactor vessel and the biological shield to reduce the temperature gradient across the concrete and prevent cracking. The shield cooling air is the major source of effluent from the Station and is filtered before being exhausted to the atmosphere at reactor building roof height by centrifugal fans. The particulate activity to be discharged will be negligible and the Atomic Energy Authority have recommended the use of filters in the shield cooling systems to be unnecessary, but the C.E.G.B. have continued with their use as a matter of prudence.

During reactor operation it may also be necessary to discharge carbon dioxide periodically to the atmosphere and "blowdown" and evacuation plants are installed to control the discharge which is continuously monitored prior to being exhausted to the atmosphere via filters from the reactor house roof. Steam raised in the boilers is at two pressures, 1,418 and 590 p.s.i.a., the higher pressure steam being supplied to turbines which drive gas circulators and force the carbon

dioxide through the reactors and boilers. The low pressure steam is fed to drive turbines coupled to alternators which generate electricity and transmit to the Grid. The steam leaving the turbines is condensed by using cooling water which is supplied and discharged into the sea at the rate of 21 million gallons per hour. The sea water is in no way contaminated in this process as the system is completely separate from the reactor building. The operation of the reactors and turbines is initiated from the control block which is situated between the two reactors. The control room is the nerve centre of the Station and with its multitude of dials, controls and protection circuits, ensures that Dungeness will operate both safely and as efficiently as possible.

It is regretted that the size of the party visiting Dungeness on October 27, 1965, will, of necessity, have to be limited but the Society is grateful to the South Thames Division of the C.E.G.B. and the Station Superintendent at Dungeness, Mr. C. D. Heath, for making the visit possible and supplying the information in this article.

Visits have also been arranged to the Alpha Cement Works at Rodmell, near Lewes (by kind permission of the Associated Portland Cement Manufacturers Limited), and to the Reed Paper Mill, Maidstone (by kind permission of the Reed Paper Group Limited).

Mr. O'Brien on the Air

Mr. W. E. C. O'Brien, Hon. Secretary of the Society's Northern Ireland Division, broadcast a talk on clean air in the province in the General Overseas Service of the B.B.C. in January. This was included in a programme known as "Ulster Magazine" and was broadcast to many countries in Europe, Africa, and to the U.S.A., Canada, and other countries.



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SMOKE CONTROL AREAS

Progress Report

POSITION TO APRIL 1, 1965—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
Acres, 3,400		
Premises, 41,060		
Smoke Control Areas in Operation	1,537	50
Acres	342,532	16,880
Premises	1,897,368	113,692
Smoke Control Orders		
Confirmed	199	13
Submitted	127	7
Grand Totals	1,907	71

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Spring, 1965), which gave the position up to January 1, 1965. They now show the changes and additions to April 1, 1965.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control Areas in Operation

Tyneside and Wearside

*Sunderland C.B. No. 6.

West Midlands

Dudley C.B. No. 7.

New Orders Confirmed but not yet in Operation

Tyneside and Wearside

Gateshead C.B. No. 7, Jarrow B. No. 3, Newburn U.D. No. 3, Whitley Bay B. No. 1.

Teeside

Thornaby-on-Tees B. No. 2, *West Hartlepool C.B. No. 2.

West Riding (North)

Baildon U.D. Nos. 2 and 3, Bingley U.D. No. 12, Brighouse B. No. 10, Horbury U.D. No. 2, Huddersfield C.B. No. 9, Leeds C.B. No. 46.

Derby, Nottingham and Chesterfield

Beeston & Stapleford U.D. Nos. 6 and 7.

County of London

Fulham M.B. No. 9, Hackney M.B. No. 9, Hammersmith M.B. No. 7, Lambeth M.B. Nos. 12 and 13, Lewisham M.B. Nos. 18 to 20, Shoreditch M.B. No. 7, Southwark M.B. No. 4.

Outer London

Acton B. Nos. 10 and 11, Barnes B. No. 6, Beckenham B. No. 3, Brentford and Chiswick B. No. 6, Croydon C.B. No. 7, Dagenham B. No. 7, Dartford B. Nos. 7 and 8 Ealing B. Nos. 19 and 20, East Barnet U.D. No. 6, Feltham U.D. No. 5, Hayes & Harlington U.D. Nos. 24 and 25, Richmond (Surrey) B. No. 6, Twickenham B. No. 4, West Ham C.B. No. 2, Wood Green B. Nos. 7 and 8.

South Lancashire and North-East Cheshire

*Atherton U.D. No. 2, Bury C.B. No. 5, Kearsley U.D. No. 1, Manchester C.B. Nos. 11 to 13, Middleton B. No. 10A,

Summary of Smoke Control Progress
As at March 31, 1965

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern	15,540	12.4	71,340	12.9
East and West				
Ridings	85,810	22.8	311,515	26.7
North Midlands ..	18,745	7.0	71,965	14.1
Greater London ..	133,500	40.8	1,231,195	46.6
North Western ..	88,055	22.0	389,825	22.9
Midlands	39,445	15.8	183,345	17.4
South Western ..	5,050	19.2	18,105	12.2
Wales and				
Monmouthshire	45	0.01	650	0.2
Totals	386,190	18.4	2,277,940	27.8

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (*e.g.* there may be some areas of open country).

Salford C.B. No. 7, Whitefield U.D. No. 7.

Merseyside

Liverpool C.B. No. 17.

West Midlands

Coventry C.B. No. 7, West Bromwich C.B. No. 14.

Potteries

*Newcastle-under-Lyme B. No. 4.

Local Authorities outside the Black Areas

Crawley U.D. No. 5, *Crewe B. No. 3, Exeter C.B. No. 8, Gillingham B. No. 3, Hemel Hempstead B. No. 5, Lancaster B. No. 3, Luton C.B. No. 3, Slough B. No. 8, Staines U.D. No. 6.

New Orders Submitted for Confirmation but not yet Confirmed

Tyneside and Wearside

Gateshead C.B. No. 9, Newburn U.D. Nos. 4 and 5, Wallsend B. No. 4.

Teesside

Billingham U.D. No. 3.

West Riding (North)

Aireborough U.D. No. 17, Bradford C.B. No. 6, Dewsbury C.B. No. 6,

Halifax C.B. No. 12, Horsforth U.D. Nos. 8 and 22, Huddersfield C.B. No. 10, Leeds C.B. No. 50, Shipley U.D. No. 6.

West Riding (South)

Doncaster C.B. No. 8, Rotherham C.B. No. 14.

Derby, Nottingham and Chesterfield

Dronfield U.D. No. 1.

County of London

Deptford M.B. No. 7, Hampstead M.B. No. 7, Lambeth M.B. No. 14, Wandsworth M.B. No. 6.

Outer London

Bexley B. No. 2, Crayford U.D. No. 3, Ealing B. No. 21, Enfield B. No. 5, Finchley B. No. 11, Harrow B. No. 9, Hornsey B. No. 7, Merton & Morden U.D. No. 7, Willesden B. No. 7.

South Lancashire and North-East Cheshire

Droylsden U.D. No. 10, Dukinfield B. No. 6, Eccles B. No. 7, Heywood B. No. 6, Sale B. No. 6, Urmston U.D. No. 4, Whitefield U.D. No. 8.

Central Lancashire

Burnley C.B. No. 7, Preston C.B. Nos. 11 and 12.

Merseyside

Huyton-with-Roby U.D. No. 4.

West Midlands

Aldridge U.D. Nos. 18 to 20, Birmingham C.B. Nos. 112 to 114, Brierley Hill U.D. Nos. 20 to 25, *Burton-upon-Trent C.B. No. 1, Rugby C.B. No. 1, Solihull C.B. Nos. 5 to 7.

Potteries

Kids Grove U.D. No. 10, Stoke-on-Trent C.B. 10.

Local Authorities outside the Black Areas

Chatham B. No. 4, Grantham B. Nos. 9 to 11, Rochester C.B. No. 2, Skipton U.D. No. 3, Yiewsley & West Drayton U.D. No. 8.

SCOTLAND**New Smoke Control Orders in Operation**

Midlothian County (Livingston New Town, No. 1), *Paisley (Gallowhill).

New Smoke Control Orders Confirmed but not yet in Operation

Dundee (Lochee), East Kilbride (Murray St. Leonards), Glasgow (Cathcart, Nos. 1 and 2; Dennistoun), Motherwell (Lodge and Paterson Street), Paisley (George Street, Espedair), Rutherglen (Fernhill).

New Smoke Control Orders Submitted but not yet Confirmed

Coatbridge (Kirkwood, Drumpellier and Blairhill), Grangemouth (Bowhouse, No. 2), Milngavie (Mains Estate).

MEASURING DOMESTIC SMOKE

New B.S. Standard Published

A British Standard *Method for the measurement of smoke emission from manufactured solid fuels for domestic open fires* has been published as B.S.3841. It gives a procedure for evaluating manufactured solid smokeless fuels for use in domestic open fires, on the basis of the smoke emitted during a standard test. The method is not necessarily suitable for other types of solid fuel which may have different burning characteristics, such as natural fuels and fuels developed for use in closed domestic appliances.

The preparation of this standard follows the publication of the Clean Air Act of 1956, which empowers the Minister of Housing and Local Government (in Scotland, the Minister of State) to make regulations declaring specific fuels to be "authorised fuels" for the purposes of the Act. Various classes of solid smokeless fuels—natural and manufactured—were declared to be authorised in 1956. Subsequently, with the development of many new types of such fuels, it became obvious that a standard procedure was needed to measure the smoke emission characteristics of new fuels.

In 1957 the British Standards

Institution set up a new technical committee, at the request of the Ministry of Housing and Local Government, to assess smoke emission from domestic chimneys. The work of the committee was extended in 1961 to include the preparation of British Standard methods of test for the smoke emission from solid smokeless fuels.

Experimental investigations have shown that it would be difficult, if not impossible, to find one method of test suitable for all types of fuel, and the scope of the new B.S.3841 is therefore limited to manufactured solid fuels for domestic open fires.

The test procedure is based on the measurement of smoke produced when a standard charge of fuel is burnt on an open fire. The test is carried out at one specified condition, in which the *average* radiant output of the fire is adjusted to a particular level, reasonably representative of normal domestic usage. The smoke is determined gravimetrically by collection and weighing in an electro-precipitator through which all the flue gases pass. The result is expressed as the weight of smoke produced per unit time.

Copies of B.S.3841 may be obtained from the BSI Sales Branch, 2 Park Street, London, W.1. Price 8s. 6d. each. (Postage will be charged extra to non-subscribers.)

THE DUSSELDORF CONGRESS

Selected Abstracts of Papers

The Clean Air Congress organized by the Kommission Reinhaltung der Luft (Clean Air Commission) of the Verein Deutscher Ingenieure, was held in Düsseldorf from April 5 to 7, 1965. The Exhibition held in conjunction with the Congress is reported on another page. About 1,800 persons attended the meetings and 38 papers were presented. Below we give abstracts of those papers likely to be of most interest to our readers. The papers in full are not yet available but will be published (in German) in due course in issues of the journal *Staub*.

785. The Problems of Maintaining Clean Air. Stephany, H. After a short review of efforts to maintain clean air which have continued for centuries, reference is made to technical measures in air pollution prevention. At first these were developed along empirical lines, but with the growth of industrial activities, the measures had to be extended and will not be completed so long as technology proceeds to make new discoveries. When the empirical method no longer sufficed, technological, physical, chemical and other interconnected factors had to be investigated and explored, just as much as the biological and other effects of air-contaminating substances. The work of the V.D.I. Commission for the Maintenance of Clean Air illustrates the manner in which endeavours are being made in the Federal Republic of Germany to master the whole problem, to the solution of which, 300 experts and scientists have voluntarily dedicated themselves. It has become apparent that former efforts will have to be intensified by means of research, development and in particular by an increase in education at all levels.

786. Legal Aspects of Clean Air Maintenance. Berg, J. The maintenance of clean air is accompanied by a mass of medical, biological, technical and economic problems; the evaluation of these various aspects and their due co-ordination belongs

to the field of legislation. The fight against growing air pollution gives rise to the following basic questions: Which air pollutants are now or will in the near future be detrimental to health, and thus render action by the State necessary? What are the existing technical possibilities to alleviate such pollution? To what extent can the owner/operator of a plant be economically expected to implement the necessary alleviating measures? It is the legislator's task to reconcile here the different and often conflicting viewpoints and to provide an adequate solution. It is indispensable that such a solution should be uniform federally and this is not possible within the present constitutional structure of the Federal Republic. The author stresses the need to work towards uniformity of clean air regulations throughout the different provinces.

787. The Part Played by Atmospheric Dust on Health. Schlipkoeter, H.-W. After a short introduction regarding the dust situation in large industrial conurbations, attention is drawn to the human aspect; assimilation of dust into the body and the reactions subsequent to its absorption are described. The behaviour and effects of dust are thoroughly discussed and possible dangers indicated. In conclusion, the demands made by the medical profession for a dust measuring instrument are set out and substantiated. It is further pointed out that fight against dust should not be indiscriminate but concentrated on crucial points.

788. New Developments in the Sphere of Wet Washing of Waste Gases from Oxygen Steel Works. Baum, K. The wet purification of gases has been resorted to during the last ten years by means of building highly developed "Venturi" scrubbers, used in particular for the separation of "red" or "brown iron smoke" that is caused by various oxygen steel processes. In this way success is achieved in separating the very finest suspended substances (e.g. those having a particle size of $0.2-0.3\mu\text{m}$) with over 99 per cent efficiency. The basic principle

is that the gases to be purified are accelerated in a Venturi channel to speeds ranging from 60 to 150 m/sec. in such a manner that the washing fluid, introduced into the throat of the Venturi tube across the gas stream, is atomized by a correspondingly high gas pressure into finest mist particles, thus ensuring the moistening and collection of these particles by the washing fluid. Such Venturi scrubbers have been employed with greatest success with single aggregates having a capacity up to 300,000 m³ of waste gas per hour, whereby a dust content of 150 mg/Nm³ and less has been achieved in the clean gas.

789. Requirements for the Development of a Dust Extraction Technology. Brandt, H. The technical directives for clean air maintenance of August 8, 1964, require that every type of dust emission shall be restricted as far as the present standard of technology allows. With further development of dust extraction techniques, it is hoped that in addition to the minimum or obligatory limits of emission, the desirable values shall be attained. Dust emitting plants impose varied, sometimes unforeseeable demands on their extraction equipment, making measuring techniques very difficult and often unreliable. Further, various processes such as the firing of coal with a high ballast content, require a degree of dust extraction that cannot yet be reliably obtained under all conditions. There are also processes such as the crushing and mixing of road construction materials, which need mobile dust extraction plants of greater dimensions than is permissible. The demands made on dust extraction installations should be kept within due limits; measures should be taken to reduce gas and dust, provided that such measures do not prejudice the process in question. It is discussed how far it is possible physically to reduce the residuary dust content of the purified gas resulting from the various dust separating systems and to what extent it would be possible to make dust extraction equipment less sensitive to unexpected changes. Technical possibilities for improved methods of operation are suggested, in order to achieve the highest degree of dust extraction from the various installations.

790. The Assessment of Gaseous Air Contaminants from the Health Angle. Petri, H. Apart from the harmless gaseous substances termed as "clean air", there are a number of molecularly dispersive gases and/or vapours, both of technical and natural origin, that have a patho-

physical effect or one which is injurious to health. Various substances can be detected even in small quantities by their odour and, given certain concentration, may become a nuisance. Gases with particularly intensive odours are listed. Substances which, apart from a certain disturbing smell, have a bearing on health through their irritating effects on physical tissues are: sulphur dioxide, sulphur trioxide, hydrofluoric acid and other acid aerosols; in addition ozone, chlorine, bromine and nitrous gas come into consideration. There can be a considerable deviation among these substances between the perceptible taste or smell threshold and the eventually perceptible irritation of the mucous membrane of the respiratory tract or the connective membrane of the eye. Further, odourless carbon monoxide is of great interest, especially as an immission in motor road traffic. Organic compounds which also have to be considered include volatile aliphatic and aromatic hydrocarbons and the products of the oxidation thereof, such as aldehydes, ketones, phenols, acids etc. For the sake of human well-being, closer attention must be paid to the biological evaluation of gaseous and vaporous immissions and to the special types of effects of such substances.

791. Danger to Vegetation through Gaseous Air Pollution. Goerke, W. When certain air contaminating substances such as sulphur dioxide, fluorine combinations, chlorine, hydrogen sulphide and nitrous oxides reach certain concentrations, vegetation is injured. Acute injury arises through high, short period concentrations of injurious substances, which result in many cases in the destruction of plant tissues. Chronic injuries, caused by sub-lethal doses lead to a reduction of the crop and distorted growth. It is difficult to provide proof of injury; however this is easier in case of acute injury than in a chronic one where specific symptoms are often lacking and where injury may often be due to other causes. The chemical, physical, statistical and botanical analysis procedures still require much improvement. New measuring techniques should be applied in ascertaining correlations between air pollution and plant life. Wild plants should be more widely used as indicators.

792. Basic Principles of Technical Processes for the Extraction of SO₂ from Waste Gases. Peters, W. and Juentgen, H. Difficulties connected with the extraction of SO₂ from waste gases are discussed



Carless Zone—A photograph taken during the Dusseldorf Congress, showing one of the several traffic-free shopping areas in the city centre

and reasons given for the recent development of processes which work at temperatures above 100°C . The following processes are suggested: 1. A two-stage process whereby first of all the SO_2 is oxidised to SO_3 by conventional means and the latter is then separated in the second stage, for instance, by means of an electro-filter; 2. An adsorption of SO_2 on carboniferous solid bodies. With this the oxidization to SO_3 takes place on the surface of the solid body. The SO_3 , alternatively, the resultant sulphuric acid, can then be desorbed in various ways in a separate stage; 3. The binding of SO_2 on metallic oxides or carbonates. Here also an oxidization of SO_2 into SO_3 takes place, so that metallic sulphate is obtained. Up to now manganese-carbonate, a $\text{—Fe}_2\text{O}_3$, calcium carbonate and dolomite have proved themselves to be specially suitable for this reaction. The basic principles of the three processes are discussed.

793. Practical Experience in the Prevention of SO_2 in Experimental and Factory Plants. Henrich, G. The accumulation and proportion of SO_2 in the waste gases of West European industry make apparent the importance of the problem of developing suitable purification pro-

cesses. Generally applicable processes have yet to be found and the research work done up to now provides the following methods: 1. The employment of washing processes with water as the medium, with the frequent addition of inorganic substances causing an alkaline reaction. 2. The testing of organic absorption media for special purposes. 3. The employment of additives causing an alkaline reaction immediately together with the fuel, or their separate introduction into the combustion chamber. 4. The use of metallic oxides for the oxidation of the SO_2 into SO_3 at the higher temperatures necessary for the favourable balance situation and the speed of reaction. 5. The use of dry adsorption processes via surface-active media, through which the waste gas is passed either in the stationary or moving bed. Subsequent to the saturation of the adsorber and the requisite reduction of the SO_3 formed, the adsorption media are regenerated. Disadvantages of the wet washing methods are discussed; the dry adsorption processes permit final gas temperatures that are above condensation point and a corresponding buoyancy of the gas plume. The first operational plant using the Reinluft process will be shortly working at a synthetic fibre

production plant, where some 50,000m³/hr of waste gas will be purified, containing SO₂ as well as carbon disulphide and hydrogen sulphide.

794. Examples of the Application of Catalytic Afterburning in Stationary Systems and Vehicle Motors. Moody, R. A. (delivered Betz, E. C.) The prospects of eliminating air pollution seem bright providing a single reliable, economical solution is found for handling the different emissions from the various processes and reaction residues. The catalytic afterburning process can suitably remove pollutants in gas form from industrial and automobile exhaust gases. The effectiveness and efficient operation depend to a large degree upon many factors. Distinctions and characteristics of six typical examples of catalytic combustion systems are considered here. These include: apparatus construction, technical control equipment, technical safety equipment, off-gas volume, description of the process, catalytic reaction temperature, degree of effectiveness, catalysts used, catalyst life-span, investment cost, operating costs, energy recovery, and coupling with a second heating process (production of hot air, steam or electricity). Another example deals with test results from a catalytic afterburning system for automobile off-gases from a city in California, used by permission. Further information on prospective operating costs and the life of such a system will be discussed.

795. Education and Publicity for Clean Air. Marsh, Arnold. The paper discusses some of the principles underlying the work in Britain on education and publicity for clean air that may be of interest in other countries. The air pollution problem in Britain is outlined and educational publicity activities are seen mainly as a means for creating a favourable public opinion for supporting measures to prevent or control pollution. This is particularly important in Britain because of the extent of the domestic smoke problem, due to the traditional use of bituminous coal in open hearths, but it is suggested that the education of the public and their support, is important in all countries and is becoming especially necessary in relation to the growing problem of pollution from road vehicles. The paper considers mass and selective publicity methods and advocates concentration of effort rather than diffusion over too wide a field, especially if resources

are limited. Low cost mass publicity, through the provision of news and information to the press, radio and television, is considered. Stress is laid on the importance of specialized publicity directed to groups that are important either because they create and lead public opinion or are especially concerned with the problem, such as central and local government members and officials, industrialists and fuel technologists, health and medical associations, etc. The paper stresses the importance of accuracy and freedom from exaggeration in the promotion of publicity, and discusses the value of technical and similar specialized educational work, and how this may be linked with more popular propaganda. Mention is made of some recent British activities. Finally, emphasis is given to the need for persistence of effort, which even though limited is preferable to major but sporadic activities followed by periods of stagnation.

796. A Dynamic Air Resource Management Programme in Chicago. Fitzpatrick, M. S. Chicago, the second largest city in the U.S. with a population of 3½ million, was the first American city to adopt a smoke abatement ordinance in 1881. With the most varied industrial complex of any city in the U.S., Chicago consumes 15 million tons of coal annually, 750 million gallons of oil and 200 billion cubic feet of gas. A new Air Pollution Control Ordinance became effective in 1959 and gave the Department of Air Pollution Control unprecedented enforcement power in addition to strengthening and improving its administration. In 1962 the Department entered into a five-year Technical Assistance Programme with the U.S. Public Health Service in order to develop an Air Resource Management Programme for the city, with eight realistic goals which are listed. Significant progress was made during the first year towards realization of these goals. Chicago's programme with the steel industry will assure control in the next five years of some 60,000 tons of particulate matter which could be generated annually by steel producing facilities. The cost to the participating companies is estimated as more than 50 million dollars. The department has been awarded a federal improvement grant of more than a million dollars to accelerate its activities during the next three years. These funds will be used mainly to purchase new scientific equipment and to employ additional enforcement and technical personnel. As far as is known, this federal grant gives the City of

Chicago the largest budget for air pollution control of any city in the world.

797. The Influence of Air Pollutants on Fibrous Matter. Travnicek, Z. During the last twenty years, attention has often been called in literature to the fact that atmospheric pollution under certain circumstances, can lead to a rapid destruction of fibre forming polymers. Thus there are reports of spontaneous destruction of ladies' stockings by motor exhaust gases and in the neighbourhood of railway stations, power stations, chemical factories etc. To ascertain such damage, a laboratory has been established in Varnsdorf, Czechoslovakia and equipped with a Smog Simulator and an Aerosol Chamber. In the Smog Simulator exhaust gases are produced, dehydrated, detarred, diluted with air, activated by light and brought into contact with fibrous samples over a lengthy period of time. The Aerosol Chamber can take 250 samples of variously charged chemical loose-end threads which are treated by discharge 72 times per minute. These samples are also exposed to these air polluting substances: sulphuric acid diluted with mist, sulphur dioxide, formaldehyde, nitric oxides and exhaust gases. The temperature can be finely regulated in both the Smog Simulator and the Aerosol Chamber. The experiments with polyamide fibres propose to show what effect upon fibrous matter is to be attributed to air pollution in conjunction with the weather.

GENERAL ABSTRACTS

798. The Urban Factor in Chronic Bronchitis. Holland, W. W. and Reid, D. D. (*The Lancet*, Feb. 27, 1965, 445-448). A survey of the prevalence of respiratory symptoms and sputum production, and of lung-function levels, was made in Post Office employees doing similar jobs either in central London or in and around the three towns of Norwich, Peterborough, and Gloucester. These areas differ notably in the reported death-rates from chronic bronchitis. Particularly over the age of 50, the London men had more and severer respiratory symptoms, produced more sputum and had significantly lower lung-function-test results. Personal smoking habits were shown to be closely related to the frequency and severity of respiratory disturbance; but urban-rural differences in these habits could not explain the greater prevalence in London of symptoms, phlegm production, and poor

lung-function. Of the factors reviewed in this study, differences in local levels of air pollution appeared to be the likeliest cause of the difference in respiratory morbidity between men working in central London and those in the three rural areas.

799. Air Pollution in a City Street. Waller, R. E., Commins, B. T., and Lawther, P. J. (*Brit. J. Industr. Med.*, 1965, 22, 128). Measurements of the concentrations of smoke, lead, and five polycyclic hydrocarbons in the air have been made in the City of London in the middle of a busy street and at two control sites. Samples were taken only throughout the daytime hours on weekdays to enable us to assess the maximum contribution made by traffic to the pollution in the street. The results showed that during these periods the air in the middle of the street contained three times as much smoke, four times as much lead, and 1.7 times as much 3:4-benzpyrene as were present in the general atmosphere of the City of London as estimated from samples taken at the control sites. One of these sites was chosen because it was only 150 feet away from the street; analyses yielded no evidence that the traffic contributed to the pollution sampled there. Sulphur dioxide concentrations were determined in the early part of the study and the results showed that traffic appeared to add little to the background level. The concentrations of lead found were below those held to be safe by many authorities. Carbon monoxide concentrations, reported in greater detail elsewhere, sometimes reached the accepted industrial maximum allowable concentration of 100 p.p.m.

Smoke Control Evasions in Coventry

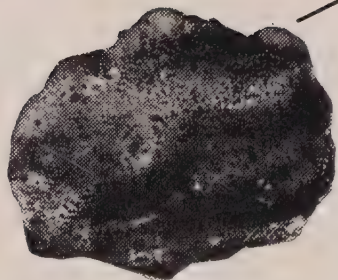
Some coal merchants are causing Coventry health officials quite a headache by supplying people in smokeless zones with COAL.

Public health officials report that most of the 12,000 Coventry houses in smoke control areas comply with the rules.

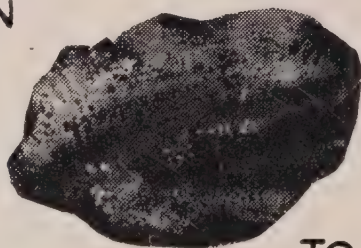
But there are some people who "do not appreciate the benefits of smokeless zones" and defy the rules.

And one of the biggest problems for the health department is the coal merchants who continue to supply people in smokeless zones with coal.—*Coventry Express*, April 30, 1965.

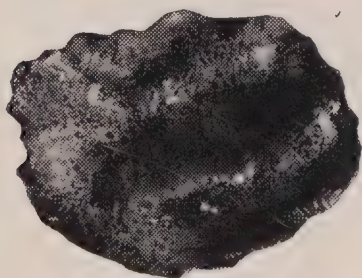
‘THERE'S NOTHING I
WOULDN'T DO FOR A
PRINCESS’



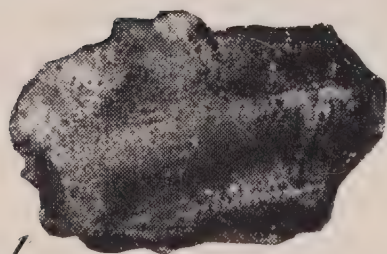
‘FACTORY
SEALED CONVECTION
CHAMBER - SO NICE
TO KNOW YOUR
HEAT ISN'T WASTED’



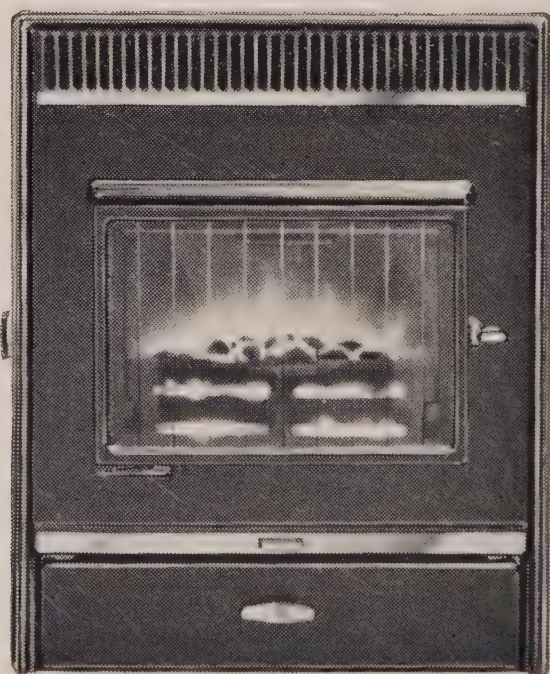
‘TRUST A
PRINCESS
TO COPE WITH BATHS
AND CENTRAL HEATING’



‘PLUS 2000 CUBIC
FEET OF ROOM HEATING’



‘BREEDING COUNTS
COMES FROM A GOOD
SMOKELESS FAMILY’



RAYBURN PRINCESS MADE BY ALLIED IRONFOUNDERS 

One of a large and highly efficient family of smokeless fuel appliances

ALLIED IRONFOUNDERS LTD, DOMESTIC APPLIANCE DIVISION, CADBURY ROAD, SUNBURY-ON-THAMES, MIDDLESEX

News from the Divisions

NORTH WEST

The Annual General Meeting of the Division was held at Leigh on Tuesday, March 16. Mr. James Goodfellow, F.R.S.H., M.A.P.H.I., the Chairman of the National Executive of the Society, spoke on smoke control at the conclusion of the business. A spirited question period followed.

YORKSHIRE

The 17th Annual General Meeting of the Yorkshire Division was held in the Civic Hall, Leeds, on Monday, March 16, 1965, and was attended by 60 members and representatives.

A discussion followed on the Domestic Fuel Supplies White Paper, which was described as "being used as a stumbling block by certain factions to avoid implementing the Clean Air Act". The Yorkshire Division has maintained for many years that a general change in fuel usage 'was necessary and throughout the discussion emphasis was given to the wide

variety of appliances and fuels now available in the Division.

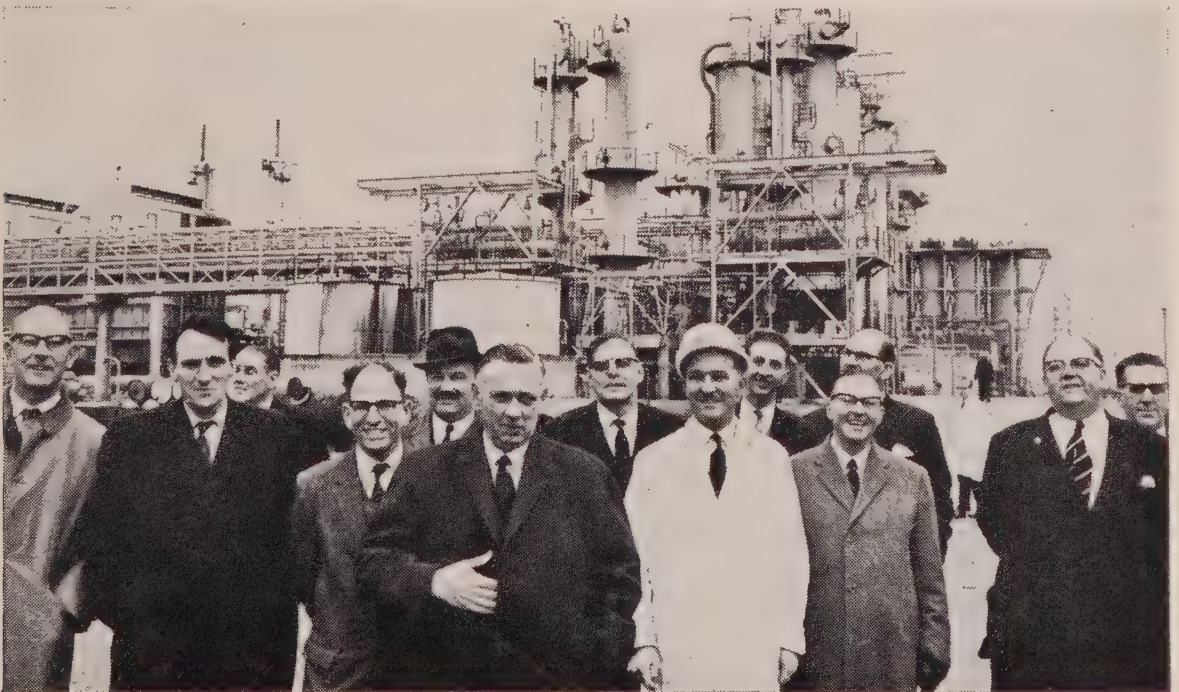
At the conclusion of the business Mr. J. A. Ambrose, Sales Engineer, Messrs. Heenan and Froude Ltd., gave a talk on "The Incineration of Waste Materials".

WEST MIDLANDS

Members of the Division met at Meriden for the Annual General Meeting on Wednesday, April 21, 1965. When the formal business of the meeting had been concluded, members adjourned to the Lurgi Gas Plant at Solihull and were conducted around the installation in small groups.

EAST MIDLANDS

Two meetings have been held in the Division recently, the first being in Derby, when the morning session was devoted to a visit to the Works of International Combustion Limited, manufacturers of water tube boilers, mechanical stokers, pulverized fuel firing equipment, heat exchangers and many other products currently in use in modern industrial undertakings. Members were received by Mr. R. Burleigh, Works Director,



Members of the West Midlands Division at the Lurgi Gas plant at Solihull

and were the guests of the Company for the lunch which followed the tour of the Works. The Mayor of Derby (Councillor J. Dilworth) expressed thanks to International Combustion Ltd., for arranging a most interesting and instructive visit.

The afternoon session was held in the Chamber of the Council House. The Mayor of Derby extended a civic welcome and members were addressed by Mr. G. Paul B. Woodward, A.M.Inst.F. on "Development of Plant to Comply with Clean Air". Mr. Woodward confined his remarks to the machinery fitted to the fireplaces of boiler houses in municipal, commercial, industrial, Crown and religious establishments where coal was being fired to produce hot water, heating and/or process steam.

He emphasized the problems confronting the construction designer in relation to smaller plant development and spoke of the designer as being no less wedded to the desire for clean air than the members in his audience. An excellent discussion ensued after which thanks were expressed by Mr. J. F. Edwards (Cambridge) who emphasized the Division's debt to Mr. Woodward for his excellent paper and to Mr. R. Davies (Chief Public Health Inspector, Derby) and Mr. E. Raven (Senior Smoke Inspector, Derby) for arranging the local details.

A further meeting of the Division was held in the Regors Cinema, Creswell, on Wednesday, April 14, when addresses were given by Dr. D.

Davies, M.R.C.P., and Mr. T. Henry Turner, M.Sc., M.I.Mech.E M.I.Loco.E., F.I.M. Dr. D. Davies, Physician Superintendent, Ransom Hospital, gave an address on the medical aspects of air pollution (excerpts from which we hope to publish in our next issue).

Mr. T. Henry Turner, Deputy Chairman of the Society, spoke on Clean Air Success Stories, Policies and Actions. In his introduction, Mr. Turner referred to the comfortable underfloor central heating that citizens of the Roman Empire enjoyed in the Creswell area for 300 years before they were driven out by barbarians, and went on to refer to the unheated castles and hovels of the chivalry and serfdom of the Middle Ages. He branded fear, vested interests and lazy conservatism as the forces hindering the implementation of the Clean Air Act, and went on to make a special appeal to the women in the audience, describing their important role on local councils and in the home. The National Society for Clean Air said to the housewife "if you love your neighbour as yourself do not pour dirty coal smoke over them". Mr. Turner gave an historical survey of the movement towards clean air throughout his lifetime and stressed the importance of the widening choice of fuels and the recognition by industry of the importance of fuel economy. He emphasized the importance of measuring air pollution and then described the success of clean air policy in Sheffield, Nottingham, Birmingham and Manchester, all of



The Publicity Committee of the N.W. Division holding the first meeting of any outside body at the new HQ of the North Wales Gas Board at Altrincham. L. to R. are H. Clusky, Miss N. Kenyon, W. E. Pollitt, R. Lydiatt, J. Rogers and N. H. Bridges

which were experiencing for the first time the great benefits accruing from smoke control.

Leeds and London had also made remarkable progress, said Mr. Turner, and he reminded the audience that since the City of London became fully smoke controlled, about 25 of the large London Boroughs had reached nearly the same state of cleanliness. In his concluding remarks he appealed to the smaller towns to make greater efforts to achieve the same standard of smoke control as the big cities. Light refreshments were served at the conclusion of the meeting by invitation of the Chairman of the Clowne Rural District Council (Councillor D. C. Gilbert, J.P.).

SOUTH EAST

At a meeting held on Friday, April 2, the Honorary Secretary reported that arrangements were being made to visit the Charrington Solid Fuel Depot at Neasden, the National Coal Board Housewarming Centre at Edgware, the Port of London and the Gas Council Depot at Canvey Island. The meeting went on to discuss the constitution of the Division and its role in the life of the Society.

SCOTLAND

A successful annual conference of the Scottish Division was held in Aberdeen on May 20 and 21, as we were going to press. A report will appear in our next issue.

SMOKELESS AIR OVER BILLINGHAM

A Modern District Heating Scheme

From L. Mair, Hon. Secretary, N.E. Division, N.S.C.A.

The Annual Meeting of the North-East Division was held on April 29, last at Billingham-on-Tees, County Durham when some eighty-five delegates attended as guests of the Billingham U.D.C., and the Northumberland and Durham Division of the National Coal Board.

Delegates were entertained to morning coffee in the Billingham Arms Hotel and were officially welcomed by the Chairman of the Billingham U.D.C., Councillor K. L. Bates, B.Sc., J.P., after which members were divided into groups and conducted over the district heating scheme of the town centre development which had been officially opened the previous month.

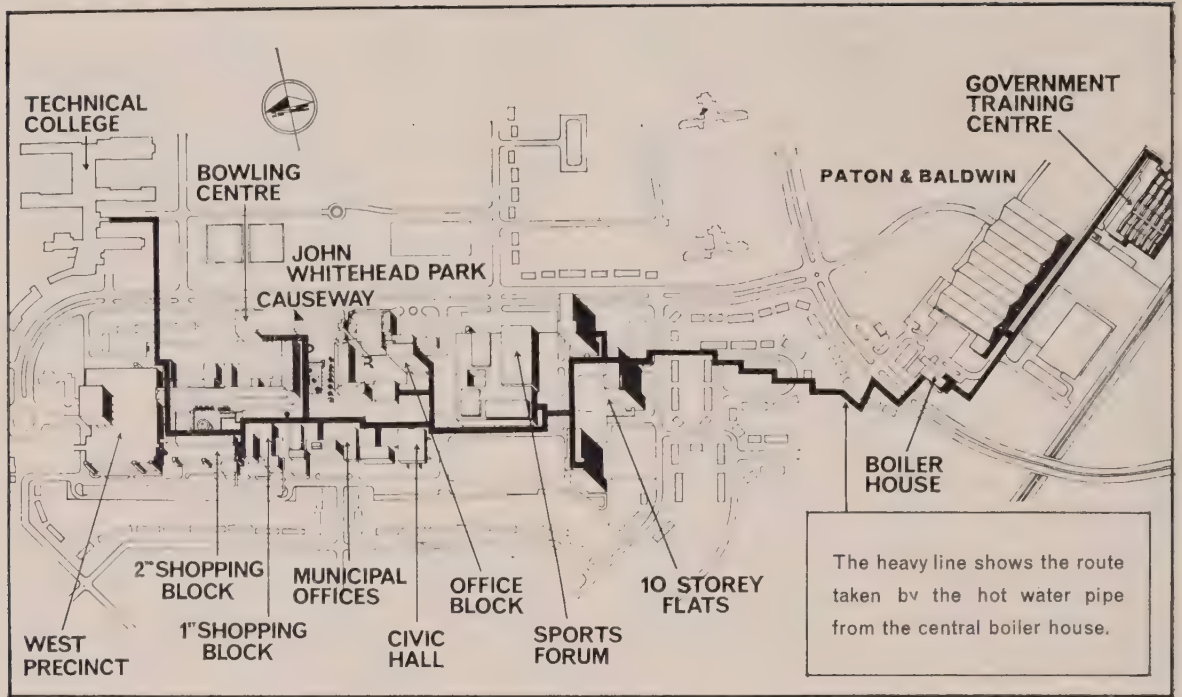
After an excellent lunch generously provided by the National Coal Board, the meeting was presented with a Symposium on District Heating by Mr. A. J. Elder, A.R.I.B.A., Consultant Architect to the Billingham U.D.C., and Mr. E. J. Milburn, Deputy Marketing Director of the Northum-

berland Division of the National Coal Board. Mr. Elder dealt with the events leading up to the decision to use coal for the district heating scheme together with an account of the many problems which had to be overcome, particularly the metering of heat supplied, before the work of installation could be put in hand.

Mr. Milburn's address dealt with the role played by the National Coal Board in relation to the design of the boiler plant, its operation, the pneumatic delivery of fuel and ash disposal, etc., and he illustrated his talk with a number of excellent coloured slides.

Town Centre Development

Because of the rapid post war industrial growth of Billingham, the district council decided to develop a new town centre. This development, in due course, incorporated a fully pedestrian shopping centre, two-tier shopping services and two-level car parking in addition to hotel extensions,



Plan of the District Heating Scheme at Billingham

blocks of flats, municipal buildings, a technical college and a bowling alley. Future buildings, on which work has started are a Sports Forum providing all indoor sports facilities as well as a theatre, another two-level shopping precinct with circulation areas, a departmental store, an office block and a night club.

In outline the scheme comprises a boiler house housing 3 x 16 million Btu's/hr., Vekos Powermaster Packaged boilers automatically fired with solid fuel, and the total maximum heat demand at present is 37 million Btu's. Heat is delivered by the circulation of medium pressure hot water through twin 8 inch steel pipes insulated in brick ducts with concrete slab tops. On leaving the boiler house the water is at a temperature of some 320°F., at a pressure of 120 lbs. per sq. inch and returns at a temperature of some 200°F.

Metered Heat

In most buildings the circulating water passes through heat exchangers or calorifiers and water at a temperature of some 170°F., is circulated inside the building itself. In multi-unit buildings, such as blocks of flats and shops, this secondary cir-

culating supply is metered to each unit in terms of therms consumed and a master meter checks the total consumed. This heat is supplied at a cost to the consumer of 1s. 3d. per therm, approximately 5d. of which is the cost of the coal used in the boiler house.

The boiler house, boilers and the associated equipment is owned and operated by the National Coal Board. The coal is delivered pneumatically from National Coal Board coal tankers into three overhead coal bunkers from which it is automatically fed by screw conveyors into the three boilers. The ash and clinker are crushed and removed from the ash-pits of the boilers by a pneumatic device and both firing and ash removal are operations free from risk of dust nuisance.

Future Expansion

At present this heating scheme covers an area of some 30 acres but the success of this present project indicates that it will be considerably extended in due course and in this way take further advantage of the availability of a local fuel and convert it to heat "on tap" without
(concluded on p. 310)

GAS FOR INDUSTRY

The Solihull Research Centre

THE first opportunity for the Press to observe at close hand the work of the Industrial Gas Research Laboratories of the Gas Council, at Solihull, was on March 29 and 30 when, instead of embarking on the type of hurried exploration normally associated with industrial visits, arrangements were made for a "settling in" to ensure that the visitors fully grasped the significance of what they were going to see.

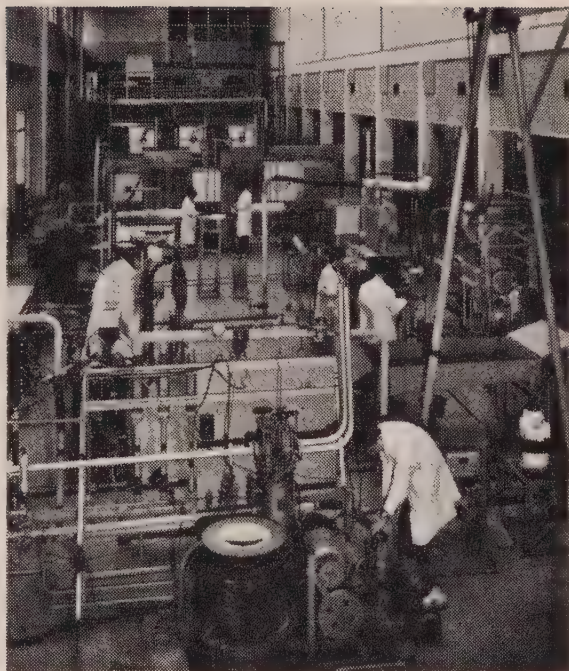
The "settling in" process took place in the country club atmosphere of a secluded hotel in Wishaw where, after the train journey from London, the party were entertained to dinner by the Gas Council and, in the informal atmosphere generated by the occasion, given an introductory talk by Dr. W. A. Simmonds, the Director of the Industrial Utilization Centre of the Midlands Research Station. Besides emphasizing the renaissance of Britain's gas industry in the past few years Dr. Simmonds expressed confidence in the ability of gas to meet the great multiplicity of needs inherent in modern industrial processes. One division of the Centre was directly concerned with this and applying the work of the other two—combustion and heat transfer, control and instrumentation to particular processes as the need arose.

On arrival at the Centre on the following morning Dr. Simmonds again spoke to the party, this time referring to the two aims of all the projects to be seen. One, to improve existing applications of gas in industry, with emphasis on increasing their suitability for automatic production and reducing fuel cost; the other the investigation of completely new ideas for applying gas in industry. Some measure of the response is shown in the following table relating to the growing use of gas by industry:

1944	—436m. therms
1953/4	—659·0m. therms
1958/9	—769·6m. therms
1963/4	—861·2m. therms

The conducted tour, in groups, that followed provided an opportunity to observe many projects being pursued in the Centre and included:

A Fully Automatic Burner with a Heat Release of 10 million Btu/h. One of a range



General view of one of the laboratories at the Gas Research Station, Solihull

of large, high density, air blast tunnel burners that provide compact heat sources (combustion intensity between 10-90 million Btu/ft³/h), complete combustion within the tunnel, and relatively high exit velocities. Equipped with fully automatic control systems, they have been used on many industrial processes, including aluminium soaking and reheating, air heaters and steel ladle pre-heating. Air is used to entrain gas, and the resulting mixture is burnt in a refractory tunnel. Multiple mixture tubes are used to obtain good turndown and reduce the overall length of the burner. This is equivalent to grouping together several smaller burners firing into a single tunnel, and it also enables one mixture tube to be fed separately with air and gas and thus to be used as a "pilot" burner. The burner is self-proportioning providing gas is supplied at atmospheric pressure from a zero governor, thus a constant air/gas ratio is maintained at all throughputs, and the heat release can be controlled by a single valve in the air supply.

Control of the gas for safety shut off is by means of an electrically operated valve. Ignition is achieved by a high tension electric spark, the sparking plug being fitted to the pilot mixture tube. An ultra-violet flame detector is used to prove the presence of the ignition spark, pilot flame and main flame during start up, and to monitor the flame while the burner is running.

Atmospheres for the Heat Treatment of Metals. Many industrial heat treatment processes for metals must be carried out in a special atmosphere to avoid deterioration of the surface finish and change of composition of the body of the metal, or, in some cases, to create controlled changes of metal composition. Where the metal composition is involved, existing method of generating the special atmospheres suffer from two main disadvantages, namely, the generator includes a catalyst, which has to be periodically re-generated and secondly, the performance of the generator is very sensitive to small changes of chemical composition of the feed gas from which the atmosphere is made. A method of atmosphere generation which does not involve a catalyst and which is insensitive to changes of feed gas employs a technique of burning a very rich mixture of gas and air in a new design of generator. This ensures that the chemical reactions are in equilibrium at the working temperature of the generator.

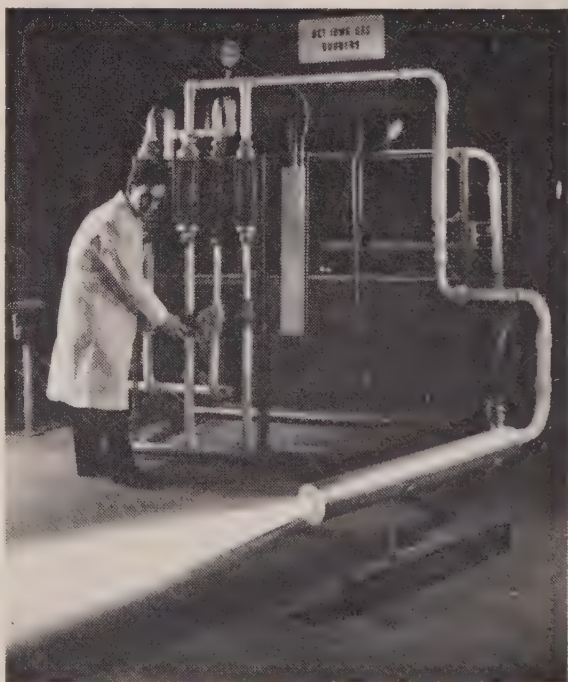
The atmosphere produced is suitable for bright heat treatment operations, i.e., maintaining a bright finish to the metal. If the carbon dioxide and water vapour in this atmosphere are removed in a molecular sieve type of scrubber, a carrier gas is produced suitable for operations such as carburising. The same design of generator can produce a slightly reducing or slightly oxidising atmosphere required in other processes. Thus one basic design of generator can produce the whole range of atmospheres made from fuel gases. The capital cost is low, while the high tolerance to changes of feed gas composition means that the expense of an elaborate control system can be saved.

Town Gas-Oxygen Burners. As bulk oxygen becomes cheaper and more plentiful it is becoming economically feasible to use large capacity fuel-oxygen burners for certain industrial processes, particularly steelmaking, where this type of burner may be used to assist the melting of scrap in open hearth and electric arc furnaces. Either reduced melt-down times or an auxiliary source of heat during electrical peak-load periods being the advantages offered. The burners required consume several thousand cubic feet of gas and oxygen per hour, and because of the problem of flash-back and explosion the two gases cannot be premixed for combustion as they are in the smaller burners commonly used for such processes as glass working and surface hardening. The gas and oxygen can only

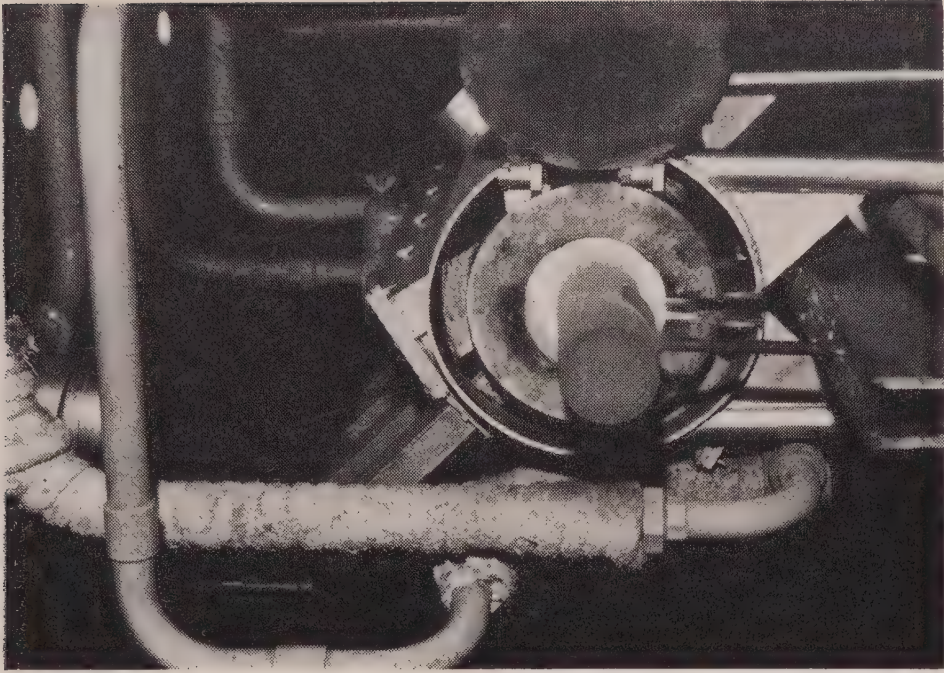
be allowed to mix when they are brought into contact and burnt at the burner head, i.e., only nozzle mixing burners are suitable.

Because the rate of reaction of oxygen with town gas is so fast, simple mixing systems are unsatisfactory and can result in diffuse flames with considerable dilution of the combustion products and loss of temperature. Consequently, methods for improving the mixing and combustion of town gas and oxygen streams are being studied at the Centre. This work has already met with some success and a burner which has good mixing characteristics has been built and tested and its performance in a 20 ton arc furnace is to be evaluated in the near future. The design of large gas-oxygen burners is still being pioneered.

Electrically Boosted Town Gas Burners. Following the announcement three years ago of a new method of raising flame temperature, originated and described by B. Karlovitz in the United States, some experimental information on this interesting new development was made available, but was insufficient to make an effective comparison with town gas-air or town gas-oxygen systems. Consequently the Midlands Research Station has developed an electrically boosted burner to run on town gas-air mixtures with the objects of comparing the heat transfer performance of this with gas-oxygen



High temperature, high velocity gas burner operating on a mixture of oxygen and town gas



Hot billet being removed from a "single cell" gas furnace after being raised to temperature during a heat transfer experiment

flames and to gain information concerning the behaviour of the electrical discharge. Work on this project commenced in autumn 1962 and a burner was first run with electrical discharge in May 1963. (Described in a paper presented to the Tenth International Combustion Symposium in August, 1964.)

The results of this work show that the boosted burner system can in some circumstances give greater heat transfer rates than fuel-oxygen flames at equal heat release rates. This advantage is diminished by the large capital cost of transformer equipment, the complexity of the supply system, consumption of electrodes and the necessity of seeding the flame with alkali metals to promote the discharge. The decreasing price of oxygen also works against the large scale application of boosted burners.

Rapid Heating of Metals. This technique proved to be one of the most popular demonstrations, perhaps because it necessitated the movement by hand of cooled billets from the demonstration furnace exit back to the entrance. Billet-heating furnaces fulfil a demand for increased heating rates for forging, extrusion etc. By applying the latest high intensity, high velocity burners, it has been possible to develop town gas fired rapid heating furnaces with heating rates comparable with those normally associated with electric induction heating, but at a reduced capital and running cost.

The furnace chambers are designed to fit closely the size and shape of the billet or other object being heated. Tangentially firing high velocity burners set up a strong vortex flow of high temperature gases round the billet, which enhances the forced convection component of heat transfer. Initial effort was on the heating of low emissivity non-ferrous billets in "single cell" furnaces, heating one billet at a time. Analysis of the experimental results gave the essential basic information on the efficiencies of heat transfer coefficients and their correlation with heat input, billet and furnace size etc. The results are at present being used, to study a very wide range of billet material and sizes, furnace sizes, temperatures, and heat input, in order to predict furnace performance and to achieve the optimum balance between the sometimes conflicting requirements of convection and radiation.

The compact nature of the rapid heating furnace and the inherent low heat storage ensures a very quick starting from cold, and little or no over-heating on shut-down due to press stoppage, die change etc. With suitable mechanical handling arrangements, this type of unit will eventually lead to a flexible heating machine, capable of fully automatic operation, linked closely to the needs of the press or other hot working machinery.

The Development of Radiant Tubes for the Indirect Firing of Furnaces. The Research Station applies a recirculation

technique using a high velocity burner as a jet pump to drive recirculation through a concentric tube arrangement of which the outer tube forms the radiating surface whilst the inner tube guides the recirculation. The hot products from the burner pass down the centre tube and are turned through 180°C at the closed end of the outer tube and return down the annulus formed by the two tubes whence some of these products escape via the flue. The burner products entrain the remainder of the returned flue products and recirculate them along the previous route. The mass flow of air and gas and the flue products is the same but the recirculation mass flow within the tubes can be three to four times as much.

It will be appreciated that with this design, all connections for gas, air and combustion products are at one end of the tube. Thus the tube can be readily attached to the outside of the furnace and moreover, can be inserted or withdrawn while the furnace is hot.

Single ended radiant tubes of this design have thermal efficiencies of 40-50 per cent at their normal operating temperatures. The incorporation of an integral recuperator in these tubes has recently been achieved with the result that the thermal efficiency has been increased to 70 per cent. The recuperator is of a counterflow flow type; the air and flue passages being annuli formed by concentric tubes. The nozzle mixing burner integral with the recuperator receives air preheated to $600\text{--}700^{\circ}\text{C}$. The station is working on the development of high temperature radiant tubes operating up to 1500°C .

An Electronic Ignition System for Gas Burners. To overcome the problems encountered in standard sources of gas burner ignition, a technique of multiple spark ignition has been developed in which pulsed low voltage (200V) from a mains driven electronic switch is fed to car type ignition coils fitted to individual burners. The electronic switch is simple and consists of an isolation transformer, a rectifier, a condenser, and a silicon controlled rectifier which discharges the condenser through the primary of the ignition coil 50 times per second. The advantages of this system are low cost, reliability and safety. The electronic switch costs more than a mains transformer, but the coils are relatively cheap. The two systems, i.e., electronic ignition and conventional transformer ignition cost about the same for three sparks, above this number the cost of the electronic system is considerably less.

Flow Visualization in Furnaces. Studies are carried out on furnace models at the station and are particularly aimed at aiding the development of rapid heating furnaces. The flow of combustion products is simulated in a geometrically similar perspex model of the furnace. When dynamically similar conditions are obtained by equating the Reynolds Numbers in the two systems, the resulting flow pattern in the model reproduces flow conditions in the full scale furnace. Both water and air have been used as working fluids. Since dynamically similar conditions require smaller velocities with water than air, the resulting flow pattern is easier to observe directly with water so that this has been mainly used. Polystyrene beads having the same density as water act as tracers to make the flow pattern visible. A very full morning concluded with the demonstration of a large high intensity burner which has reached the stage of quantity production.

Cleaner Air In Liverpool

Air pollution in Liverpool's smoke-controlled areas is a third of what it is in other parts of the city, according to Professor Andrew Semple, Medical Officer of Health, in a recent report to the Health Committee.

"There is now considerable evidence in the smoke control areas, and throughout the industrial belt of the city, of clean air in these sections," he said. "Already the pollution in the smoke control areas has been reduced to seven to 14 tons per square mile per month against 20 to 40 tons per square mile per month in areas not subject to smoke control."—*Liverpool Daily Post*, March 23, 1965.

Foundries Forced to Close

Foundries are being forced to close down because the profit margins in the industry are too low to allow firms to provide sufficient funds to comply with the Clean Air Act and the latest Factory Acts.

This was disclosed by Mr. E. C. Marsland, Chairman of the Repton group of foundries, in his report as retiring chairman of the National and Midland Ironfounders' Association.—"*Birmingham Evening Mail*", April 17, 1965.



The Society's stand at the Royal Society of Health Congress exhibition at Eastbourne in April

NEW EXHIBITION DISPLAY MATERIAL

The Society has acquired a new exhibition display unit which will be available on loan to local authorities. Known as "Speedframe Display", it consists of metal tubes which can be built up into a number of different shaped free-standing displays, to which are attached 30 ins. x 24 ins. display panels. The first display now available consists of eight panels as follows:

- Clean Air and Health
- Clean Air and the Home
- Clean Air and the Cost of Living
- Clean Air and Industry
- Clean Air and the Vehicle
- Clean Air and the Future
- and two plain coloured panels

The complete display measures 10 ft. x 2 ft. x 7 ft. and incorporates a 2 ft. x 2 ft. table for literature. It requires ten travelling cases to transport and will be sent by rail or road service vehicles.

New Framed Information Panels

In addition to the four information panels (catalogue reference I.P. 1 – I.P.4, Death in a London Fog, Why have soot with your custard?, Attack on Plant Life, and Holiday Resort), the following new framed panels under perspex are now available: (Size 30 ins. x 20 ins. except where stated.)

I.P.5 Clean Air Wall Chart—This chart was illustrated on page 208 in the Spring issue of SMOKELESS AIR. (Size 3 ft. 6 ins. x 2 ft. 6 ins.)

I.P.6 Smoke Damages Stonework—Illustrations of St. Paul's Cathedral before and after cleaning.

I.P.7 Smoke Harms the Countryside—Illustrations of the affect of pollution on vegetation.

I.P.8 Smoke is Injurious to Health—Illustrations of clean and dirty lungs.

I.P.9 Pollution from Road Vehicles—Illustrations of the menace created by both petrol and diesel-engined vehicles.

I.P.9 Pollution from Industry—Contrasting pictures of smoke-producing

factory chimneys and a model, no smoke industrial plant.

I.P.10 The Problem of Sulphur Dioxide— Photographs show the affect of SO_2 on iron railings and on leather-bound books.

I.P.11 Smokeless Zones Mean Cleaner Air— Contrasting pictures of a city in a Black area with a new housing estate in a smoke-controlled area.

Withdrawals

The following exhibition material has now been withdrawn:

L.P.1 Illuminated photomural—
"Domestic Smoke"

L.P.2 Illuminated photomural—
"Industrial Smoke"

L.P.3 Photomural—
"Waiting for Smoke Control"

"Do-It-Yourself" Display Kits

The two "Do-it-yourself" display kits consisting of large photographs and printed captions have been reduced in price from 80s. to 10s. Two sets are available:

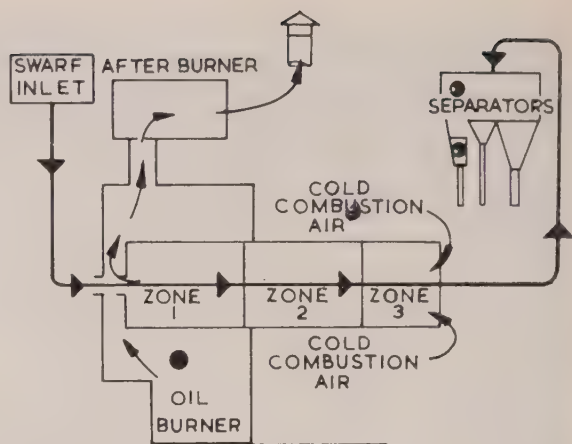
D.I.Y.1—Six Reasons for Smoke Control

D.I.Y.2—Clean Air for ME?

SMOKELESS AND DUSTLESS DRYER/COOLER

Dunford and Elliott Process Engineering Ltd. (143 Maple Road, Surbiton, Surrey) have acquired world rights for the manufacture and sale of the Intal Dryer/Cooler, a new type of plant designed for the removal of oil and combustible contaminants from all metal swarfs and turnings. An outstanding feature is the complete absence of smoke and dust emission. This is effected without the use of alkali washes to reduce the oil content, thus eliminating the problems of disposal of the mixture of wash and oil.

The dryer has three automatically controlled operating stages, as shown in the diagram above, from the swarf intake to the delivery of the final product. The dryer first stage is indirectly heated (from an oil burner) to a shell temperature pre-set to 300° to 400° C. according to the type of cutting oil present. This is sufficient to cause partial distillation of both the water and oil from the swarf together with partial combustion of the oil content, and in this stage the reducing



atmosphere is closely controlled in order to ensure that no oxidization of the swarf or turnings takes place.

The metal then moves along the drum into the second stage where the remaining water and oil are evaporated. In the third stage the swarf is cooled and dried by means of a controlled flow of external air which also provides the oxygen for partial combustion in the first stage.

The only forced draught used is in the afterburner which consists of a specially designed refractory lined chamber to which is fitted a small oil burner for ignition and boost. On a standard type of plant the rotary dryer and afterburner absorb a total horsepower of $4\frac{1}{2}$ per ton of aluminium swarf dried. The fuel oil consumption averages from 3 to 9 gallons per ton dried. It is only necessary to remove the deposits from the afterburner once every two to four weeks. Full details may be obtained from the manufacturers.

District Heating at Billingham—concluded.

producing dust or atmospheric pollution.

Such an entirely new project, an idea which demanded boldness and vision from both the Billingham Council and the National Coal Board, could not be expected to come into full operation without some teething troubles, but these are being eliminated.

There is no doubt that Billingham can be justly proud of this venture which is a showpiece that will be as modern thirty years hence as it is now.

CONTRIBUTIONS TO CLEANER AIR

Commercial and Industrial Progress

Film on New Domestic Heater

The Society has always encouraged individual effort to promote domestic clean air outside what are defined as the Black Areas of Britain. Additionally it has maintained that efficient economic use of solid fuel is always beneficial to the country as a whole and a useful concomitant to the official smokeless zones programme.

It is therefore gratifying to view a film of the new Aga Home Heater, which made its first public appearance at the Society's Exhibition in Harrogate last year. Burning Sunbrite Doubles, Gas Coke, Phurnacite or Anthracite Stove nuts the Home Heater provides an attractive, glass-fronted inset convector fire for the living room which is virtually the back of a highly efficient central heating boiler capable of producing 26,000 Btus. This means 30 gallons of hot water and 125 square feet of radiation surface!

The film emphasizes that the appliance can only be used in a dwelling designed to accommodate an aperture in the dividing wall between the living room and the kitchen. The aperture must provide a terminus and departure point for the

pipng and a 9 in. flue for the boiler stack—an eminently practical and simple arrangement if the dwelling is designed accordingly.

Besides the excellent boiler performance the "back side" inset fire can give a further 10,000 Btus in convected and radiant heat and one absorbing sequence in the film shows the living room fire being cut out completely or adjusted to merely "tick over" when heat is not required. Designed jointly by Allied Ironfounders and the National Coal Board for a three-bedroomed house, the Home Heater will give its maximum performance using 4.25 lbs. of fuel per hour. In summer when only hot water is required consumption drops to 0.75 lbs/hr.

The film explains the working of the appliance, its installation and, of necessity, its advantages. One shot of a new smoke-free housing estate provides a mute and seemingly unintentional testimony to its value to Clean Air.

In Eastmancolour, the film runs for 20 minutes and is available on free loan in both 35 mm. and 16 mm. size, from The National Coal Board Film Library, 26/28 Dorset Square, London, N.W.1.



New Gas Roomheater—The Radabeam 800 is fitted with a new radiant, developed by Radiation, which glows all over even when the gas is turned down to a third of its full rate. The price is only £19 17s. 6d., including P.T. (excluding Scotland)

HEATSTORE IN EUROPE'S HOMES

Heatstore has broken into the almost untapped Continental market for storage heaters. Following the successful marketing of the new slim-style Heatstore heaters in this country, Mr. E. C. Green, a director of Heatstore Ltd., has turned his attention to the export market and has reached an agreement with Chauffelec, a light engineering firm of Rue de la Prairie, Château-Thierry, Aisne, to manufacture the heaters under licence and to distribute them in France.

After discussions in Copenhagen with Mr. Green, Denmark may adopt the system of off-peak tariff for cheap electricity.

A further visit by Mr. Green to Holland has also produced an initial order for the new Heatstore models. The fourth Continental country to import Heatstore is Portugal, which is to have its first consignment in the new year.

Mr. Green comments, "The Continent has been watching our success with these heaters for some considerable time. I think the scope for exports is quite bright once we have the first installations in and proved."

Canada, Israel and Yugoslavia are negotiating with Heatstore to import heaters or to manufacture them under licence. The heaters for Israel will meet a demand, through climatic conditions, to release their heat during the night instead of the day.

All the countries importing the heaters from the three Heatstore factories at Wigan, Northampton and Irvine in Scotland are doing so after their electrical authorities have satisfied themselves about

their safety, efficiency and durability in stringent tests. In Britain one domestic consumer in every four choosing thermal storage heating buys Heatstore's new models.



New Portable Gas Poker

The illustration shows the Taymax 88 gas poker using butane gas. There is another model (87) with a vertical blade for use with roomheaters fitted with fire doors. The pokers cost £2 0s. 7d., and the butane container, which has three-leg stability, costs £3 12s. 6d. When empty is exchanged for a full one at a cost of 8s. 6d. Taymar Ltd., the makers, of Wear Mill, King Street West, Stockport, have also a variety of other appliances and equipment for use with the butane containers.

CLEAN AIR BY WAY OF CATALYTIC COMBUSTION—

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Review

Small Bore Heating and Hot Water Supply for Small Dwellings by J. J. Barton. George Newnes Ltd., 10s. 6d. net.

This handbook is intended primarily as a practical manual for all concerned with domestic central heating and hot water supply and will be especially useful to students and apprentices in the plumbing, heating and building industries, as well as students of domestic architecture.

The book begins with a chapter on estimating the heat loss, including losses due to air change. It then goes on to deal with pipe runs, sizing and positioning of radiators, the pump, boiler and hot water piping system. Two useful chapters deal with estimating the annual fuel cost comparing coke, anthracite, domestic oil, town gas, electric floor warming and electric free-standing radiators and block storage heaters.

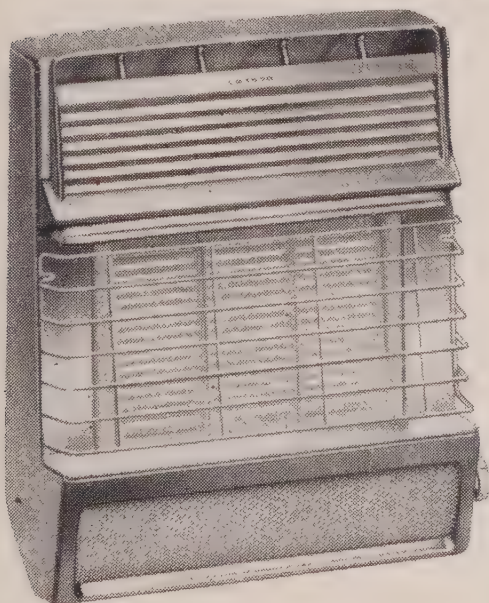
Cleaning up the North West

A leading article in the *Rochdale Observer* of April 3, 1965, entitled "Cleaning up the Towns", began:

"Residents of the industrial towns of the North-West, including those who live in Rochdale and the surrounding area, must agree that Mr. Philip Chantler, chairman of the newly appointed North-West Economic Board, talked sound commonsense when he urged a do-it-yourself drive to sweep away the grime which is one of the region's worst blots. He said that what worried him most when he returned to the North-West after an absence of 26 years was 'avoidable squalor, dirt and general untidiness.' This is harsh but fair criticism."

We are glad, though not surprised, that Mr. Chantler should have spoken out about the drabness and grime of the North West. He has been a member of the N.S.C.A. for many years, and has contributed to this journal. We wish him every success in his new post.

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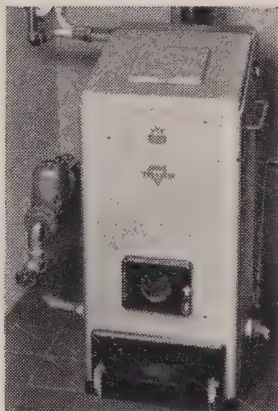
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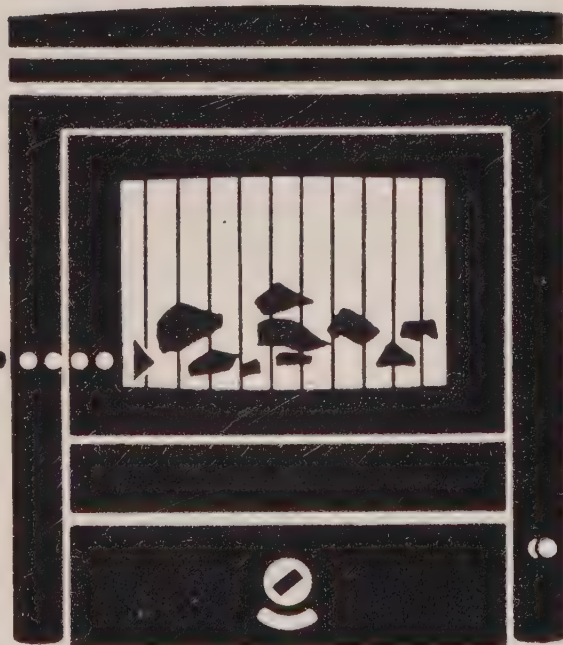
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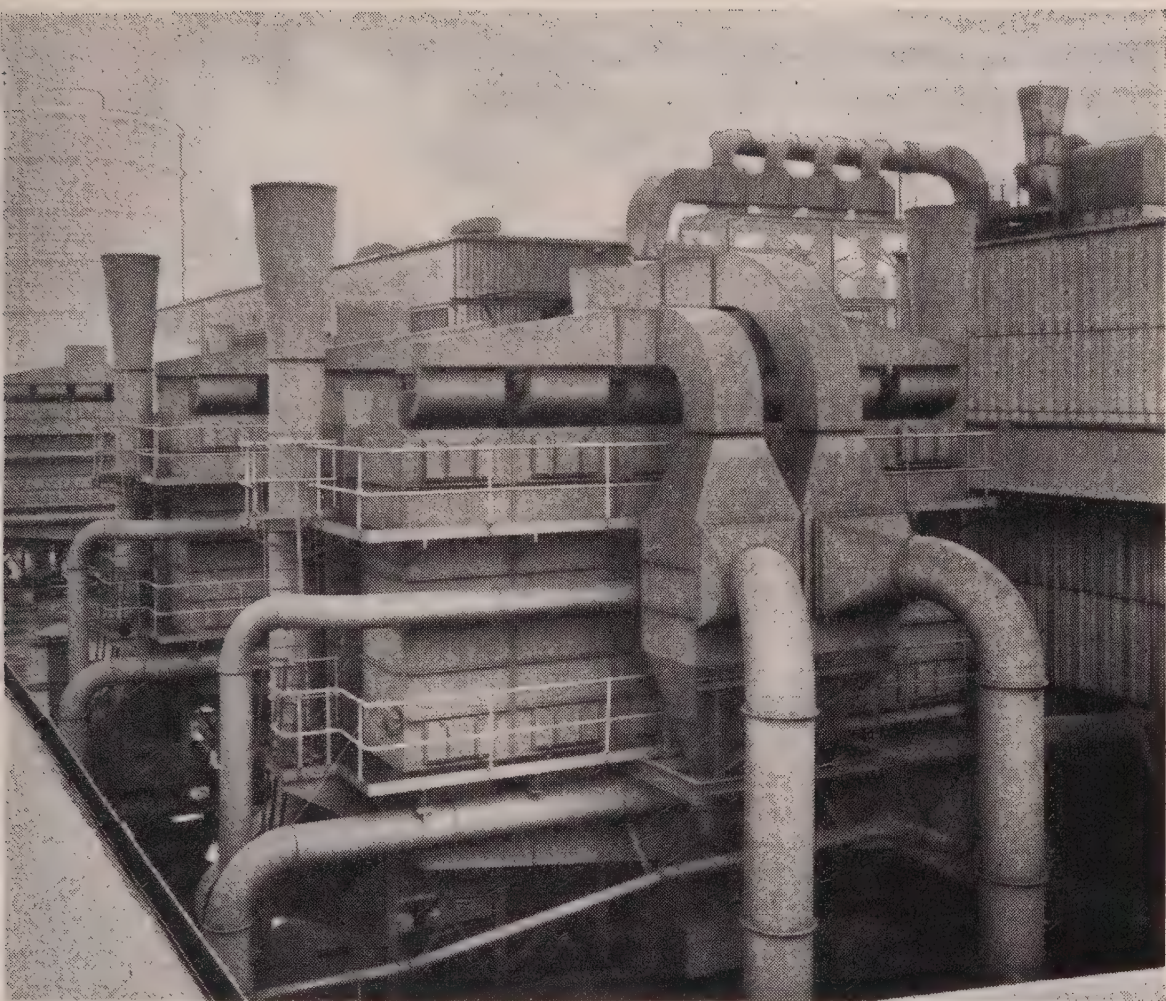
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The Holmes-Multiflux Bag Filter installation at the Dagenham Works of the Ford Motor Company Ltd. cleans exhaust air from casting cleaning machines and grinding wheels in the new fettling department. This installation, which has a capacity of 136,000 c.f.m., comprises hoods, ducting, bag filters and a dust handling and conditioning system.

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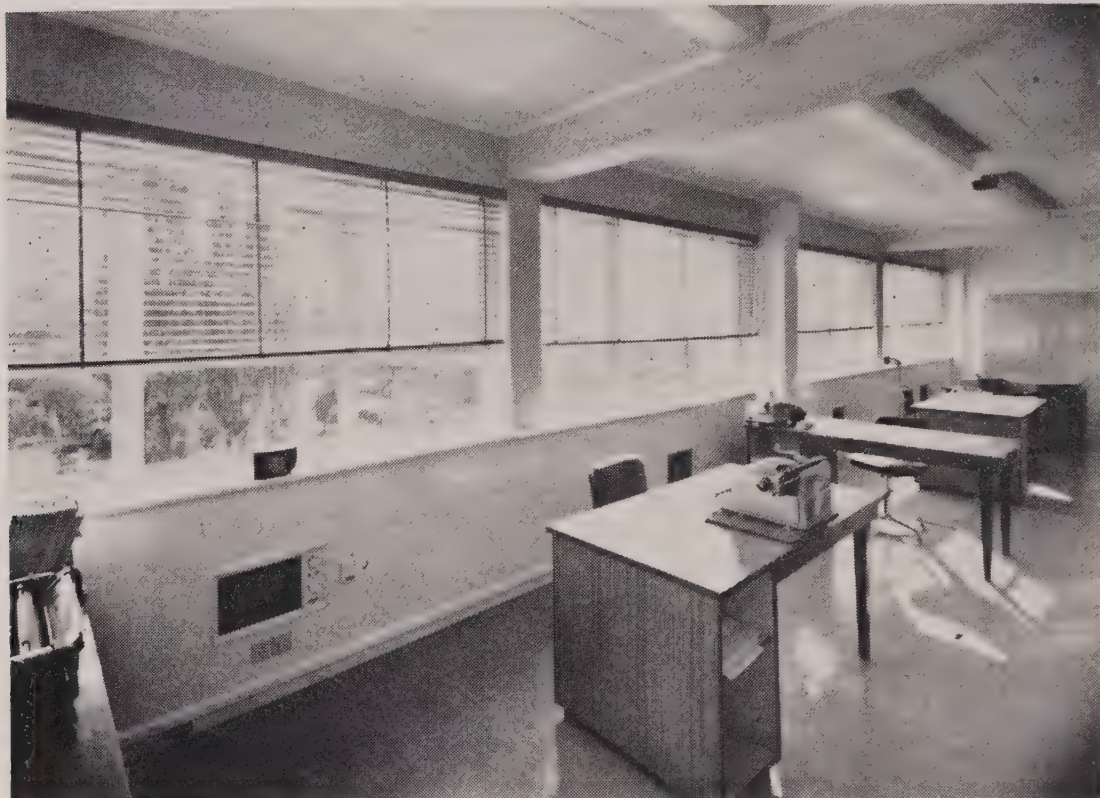
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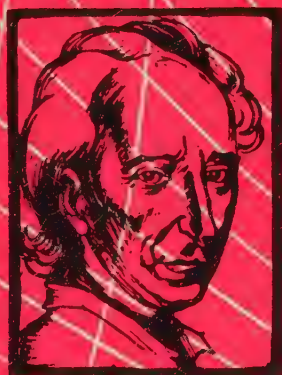
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SMOKELESS AIR

JOURNAL OF THE
NATIONAL SOCIETY FOR CLEAN AIR



No. 135 * AUTUMN 1965 * 3s.

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International Clean Air Conference to be in London

Smoke Control Grant Arrangements



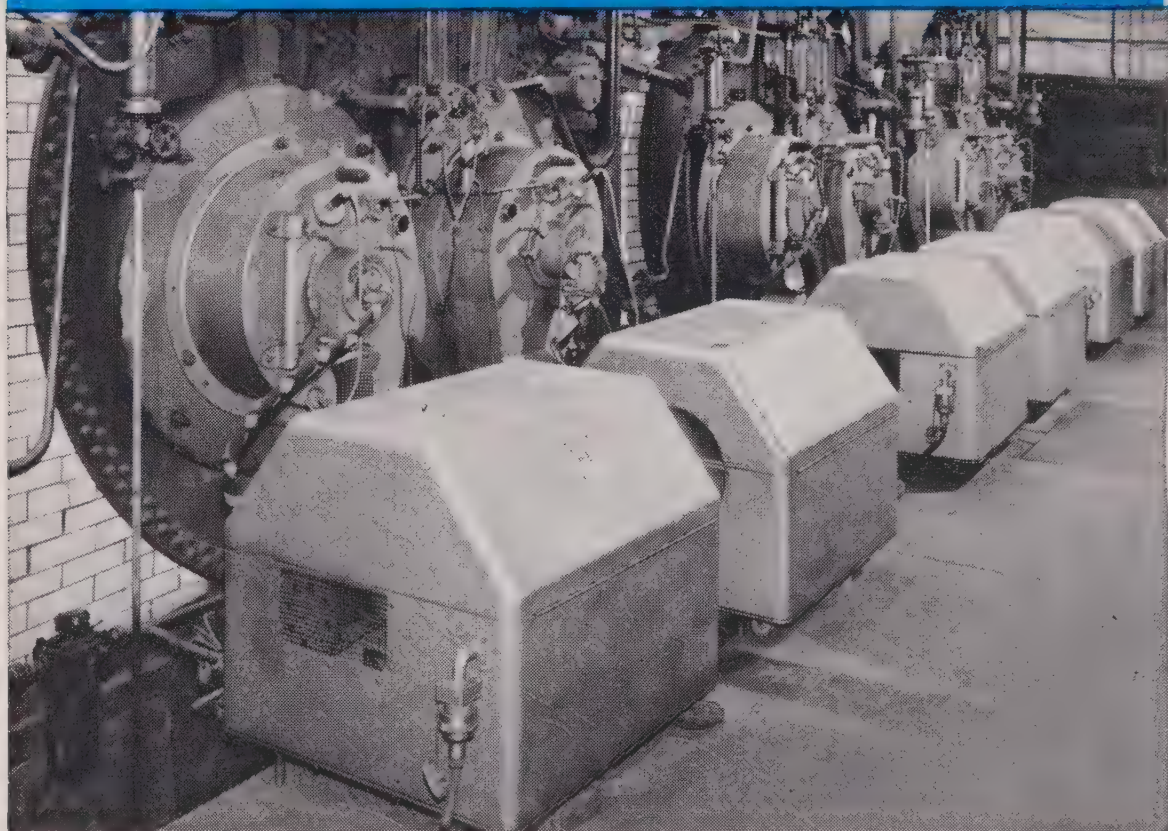
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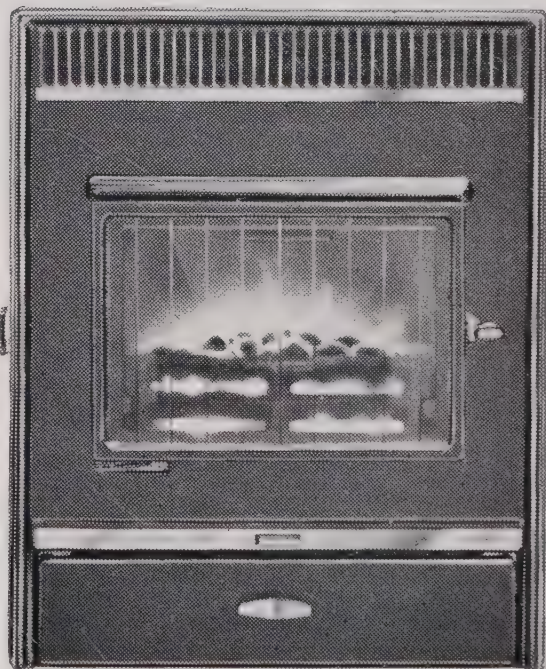
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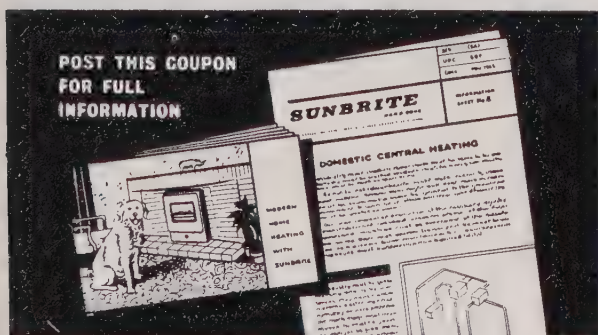
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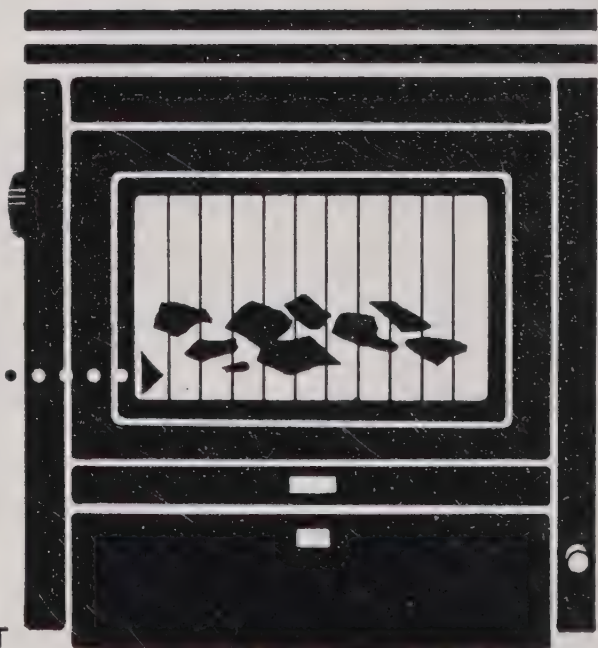
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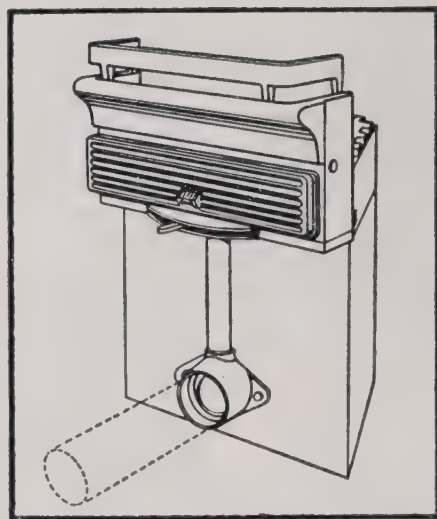


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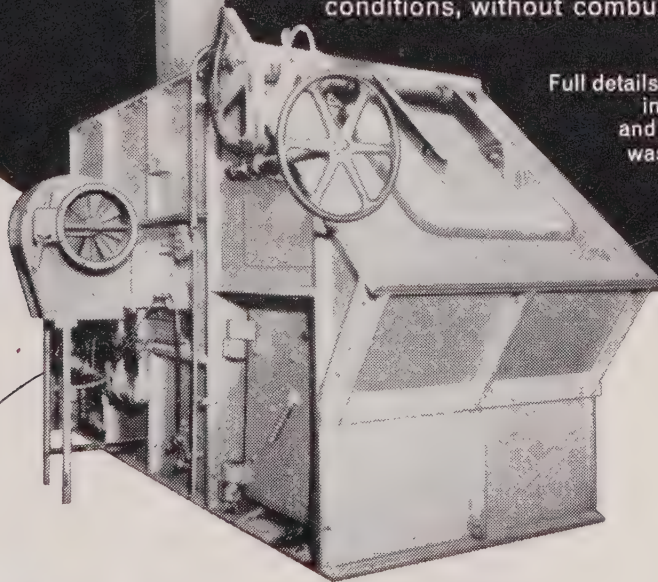
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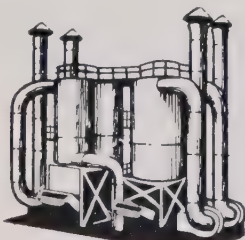
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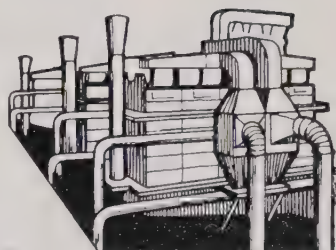
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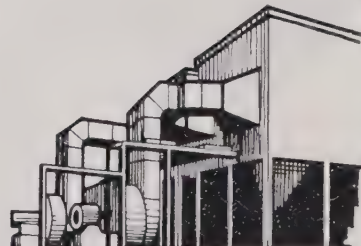
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MEMBERSHIP of the Society is invited and is open to individuals, local authorities, firms and other corporate bodies. Full details and membership application forms will be sent on request.

EASTBOURNE CONFERENCE, 26-29 October, 1965

Late registrations can still be accepted. Programme and other details from the Society on request.

INTERNATIONAL CONGRESS, LONDON, 3-7 October, 1966

See page 18 for first announcement. Please note the open invitation to submit proposals for papers, and that such proposals must be received by 31 December, 1965.

Exhibition—The Clean Air Exhibition to be held in conjunction with the Congress will be of more than usual importance. Early reservation of space by the Exhibitors is advised. Information from John L. G. Longstaff, Exhibitions Officer, NSCA.

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SMOKELESS AIR

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Autumn 1965

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SMOKELESS AIR is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided that due acknowledgments, including the name and address of the Society, are made.



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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

INTERNATIONAL CONGRESS FOR LONDON

WE are pleased to announce that the first congress of the newly formed International Union of Air Pollution Prevention Associations, will take place in London on 3 to 7 October, 1966. H.R.H. the Duke of Edinburgh has graciously accepted an invitation to be Patron to the Congress. The event will be organized for the International Union by the National Society for Clean Air, as one of its members, and it will incorporate the customary annual conference of the Society.

Under the constitution of the Union the President is appointed by the host country, so that up to and including the Congress the President will be our own President, Sir Alan Wilson. Similarly the Society's Director acts for the period as the Union's Secretary-Treasurer.

Membership of the International Union is confined to non-governmental clean air organizations, and there are at present six members—representing Argentina, France, W. Germany, Japan, the U.K. and the U.S.A. (More information about the associations is given in the new issue of the Society's *Clean Air Year Book*). It is an honour that it should have been accepted that Britain should be the country for the first congress of the new Union, and this is perhaps recognition of our pioneering work here and our existence as the oldest clean air association.

More information about the Congress, with particulars relating to proposals for papers, will be found on page 18. It should be stressed that emphasis is being given to air pollution prevention in practice, and that the programme will be of as much direct value to our regular U.K. delegates as any ordinary conference is. Associated with the Congress will be the now well established Clean Air Exhibition, which we hope will have an international flavour as well as its more familiar exhibitors.

1959-65

Many of our readers will remember the successful Diamond Jubilee Conference of the Society in London in 1959. On that occasion we were able to welcome far more delegates from overseas than had been hoped for, and received far more papers than had been estimated. With a printing strike at the critical period thrown in, the Society's small organization was able, just about, to cope. Now, embarking on another international event, we are wondering how it will compare with 1959. On the one hand air pollution studies and activities have greatly increased, during the intervening years, in many parts of the world, and a great deal of progress is being made both in research and control. We believe that the 1959 conference helped to stimulate much of

this wider awareness of air pollution, and this suggests a possibly bigger gathering next year than before. On the other hand, though, international conferences on air pollution are no longer a novelty, and there have been many during the past few years, though mostly of a specialist nature and relatively small in size. By concentrating, as the provisional programme shows, on the practical aspects of prevention and control, we believe that London, 1966, will be attractive, constructive, and helpful to all who attend.

1956-66

Another date to remember, please! The Society's next Annual General Meeting will be on 9 May, 1966, and will again be at the Connaught Rooms in London. It is planned to make this a special occasion to mark the tenth anniversary of the passing of the Clean Air Act, with an open meeting after the business meeting, and again marking the occasion at the luncheon to follow. It is yet too early to announce the speakers, but we very much hope to have with us some of those who took leading parts in the work that culminated in the passing of the Act.

Cleaner in the North

The urge to clean up our cities and their public buildings continues to spread. After St. Paul's, the grand assault in Paris, the St. George's Hall operation in Liverpool, and many others, comes news of a revolt against grime in two of our darkest (visually of course) cities, Edinburgh and Manchester. In the Scottish capital much has already been done. The Royal Scottish Academy, including a weighty and awkward statue of Queen Victoria on its top, has been cleaned, and so have a number of banks and other commercial buildings, among them the monumental head

office of the Bank of Scotland on the heights of the Mound. An enthusiastically approving article in the *Scotsman* says the directors of the Bank were "inspired perhaps by the Ministry's example and influenced certainly by the fact that smoke from railway engines had ceased to pollute the atmosphere". The effect, it is said, has been almost startling, especially when illuminated at night, "and the bank has come to be regarded with pride as a sort of secular *Sacré Coeur*". "The Clean Air Act", it is acknowledged, "combined with the decline of coal both for railways and domestic heating—the house chimney is still a big offender—offer at least some grounds for belief that buildings will remain clean for a reasonable period. It may be some time before Auld Reekie ceases to reek, but the prospects for a clean city have never been brighter since the dawn of the Industrial Revolution".

Black Cathedral

From Manchester, where new building is proceeding with exuberance, come proposals for the cleaning of its blackened cathedral. It is possibly the blackest cathedral in the kingdom. As cathedrals go it is a modest building, but none the worse for that, and it is worthy not only of cleaning but of being given a more dignified and less depressing setting. The proposal has been welcomed by the Dean, Canon Alfred Jowett, who, in the August issue of his magazine, advises a start in two years' time, "when more improvements have been made in smoke control and almost all the steam engines have gone from the railways near by". He refers to the case for leaving buildings as they weather, saying "The sense of age and maturity which time can give is in itself an aspect of a building which should not lightly be dismissed. But against this, he says, there are formidable objections, including that of damage to stonework and the depressing effect of dirt. He continues:

"Part of the horror of industrial towns has been the sense of unmanageable dirt, and the good psychological effect of any cleaning process is considerable. At a time when, as we know, the country is struggling slowly towards the establishment of smokeless zones and when the last steam locomotives (a great source of dirt in the atmosphere) are being broken up, it is pure and irresponsible romanticism to say: 'Leave us with dirty buildings'."

After the cathedral, Manchester might take a good look at its Town Hall, which more than one foreign traveller is reported to have believed to be built of coal, and at one or two other buildings in the centre of the city. Especially might it give thought to the cleaning of the lovely Rylands Library in Deansgate, so dark and self-effacing among its less lovely neighbours that it is hardly noticed.

Keep One Dark?

The writing of these notes on buildings has prompted the thought that if this urge for cleaning continues we should perhaps preserve at least one blackened, soot-encrusted building of note as a kind of museum piece for future generations to see what things were like in Britain during the Smoke Age. If so, where should it be sought and how chosen? Maybe, however, there are sufficient buildings so deplorable that no one would think of cleaning them or be able to raise the money to do so.

Choking Organs

Reports of odd and unexpected consequences of air pollution are always cropping up. We have just read an account of how the polluted air of New York is choking the pipes of church organs, to the increasing concern of the American Guild of Organists and their hundreds of members who play in New York each Sunday. The trouble is said to be the

rotting, through air pollution, of the sheepskin valves that are part of each organ pipe, of which there may be—so it is said—thousands in a large church organ. At one time these valves would last 20 to 30 years; now they are good for about five years only. "When an organist pushes the keys on Sunday morning", we are told, "the unpredictable sometimes happens: there may be the hissing sound of a baby cat, the piercing sound of a note that will not stop, or simply silence". Have any of our readers any knowledge of such damage to organs in this country?

800 Million Cars

Trust an American to paint a vivid picture. Professor Morris Neiburger of the University of California is reported to have said that the world will not end in a nuclear flash because humanity will smother in smog first. Imagine, he said, the amount of smog that would accumulate if every one of the 800 million Chinese drove a car—as may happen there and elsewhere in the world when their living standards rise to those of Los Angeles. If we go on at our present rate of filling the atmosphere with the poisonous fumes of cars, our planet will become uninhabitable within 100 years. The alternative doom of course—according to other American predictions we have reported—is that at this rate the increase in the carbon dioxide content of the atmosphere will so warm up the world that most of us will first be drowned or flooded out by the melting of the polar ice caps. It is easy to smile at such alarming warnings, but in all seriousness is it not about time that humanity began to look a little more closely at where it is going?

It was announced, as we went to press, that the Minister of Housing had rejected an application from Shrewsbury B.C. to rescind a smoke control area order.

Smoke Control Grant Arrangements

New Ministry Circular

Ministry of Housing and Local Government: Circular No. 51/65, dated 28 June 1965: Clean Air Act, 1956, Grant Arrangements. H.M.S.O. 9d. net.

THE purpose of this new circular is to simplify and clarify by introducing important modifications to the grant arrangements in smoke control areas following the changes made in Circular 69/63. This, it will be recalled, followed the report on domestic fuel supplies and permitted grants to be made on openable stoves or roomheaters, and equivalent appliances using other fuels. Difficulties arise in the interpretation of what is “reasonably necessary” and are said to have involved both the local authorities and the department in a great deal of correspondence.

The new circular says that “it will cut down paper work, and thus speed

up the establishment of smoke control areas, if the ‘reasonably necessary’ cost of new appliances purchased by owners and occupiers in smoke control areas is in future assessed on a different basis.”

The circular lists the cost limits for various types of appliances. 19 items are listed as an appendix, and as they are of especial general interest the list is quoted in full below.

It is for the local authority to decide, within the appropriate cost level, what costs are reasonable in each case. The Minister will accept as qualifying for Exchequer contribution expenditure which is acceptable to the local authority and which falls within the limits shown in this list, but he will not normally accept any portion of the cost (excluding installation cost) which exceeds the stated limit.

It is pointed out that it remains a

Smoke Control Area Grants; Cost Limits for Various Appliances (Appendix I of Circular 51/65)

	£
Improved open fire (including integral gas ignition appliance and, where necessary, deepening plate or bar).	6
Improved open fire (including integral gas ignition appliance and, where necessary, deepening plate or bar) with boiler.	17
Underfloor draught fire; above hearth type (including integral gas ignition appliance and, where necessary, deepening plate or bar).	9
Underfloor draught fire: above hearth type (including integral gas ignition appliance and, where necessary, deepening plate or bar) with boiler.	17
Underfloor draught fire: sunk ash pit type (including integral gas ignition appliance and, where necessary, deepening plate or bar).	14
Underfloor draught fire: sunk ash pit type (including integral gas ignition appliance and, where necessary, deepening plate or bar) with boiler.	23
Solid fuel room heater.	26
Solid fuel room heater with boiler	36
Gas room heater	24
Electric thermal storage heater	29
Oil room heater	16
Solid fuel cooker with boiler	50
Gas cooker	35
Electric cooker	35
Electric immersion heater (including installation)	15
Wash boiler (Gas and Electric)	13
Gas pokers (including flex and tap)	2
Bottled gas igniters	3
Electric kindlers	8

principle that facilities of a standard approximately equal to that of existing facilities should be provided, but that extra costs should not be incurred solely to provide higher standards. It is pointed out that the installation of a modern smokeless appliance in place of a coal-burning fireplace may incidentally provide a higher standard of heating, but that this will not preclude grant on the full payment.

A number of other matters are referred to, and a further appendix revises paragraph 26 of the Ministry's Memorandum on Smoke Control Areas, in which reference is made to the changes arising from S.95 of the Housing Act, 1965.

NORTHERN IRELAND

Clean Air Act in Force

The Clean Air Act (Northern Ireland) 1964 came into operation (under S.I. Northern Ireland, 1965, No. 72) on the first day of July, 1965.

The Government, through the Ministry of Health and Social Services has published a "Memorandum on Smoke Control Areas" (H.M.S.O., 2s. 3d. net) and Statutory Orders on:

Dark Smoke—Permitted Periods (No. 73).

Dark Smoke—Permitted Periods—Vessels (No. 74).

Smoke Control Areas—Authorized Fuels (No. 75).

Smoke Control Areas—Exempted Fireplaces No. 76).

The Memorandum and the regulations are similar to those under the Clean Air Act, 1956, and the grant arrangement modifications reported above in the Whitehall circular are incorporated in the Northern Ireland Memorandum, including the cost list. The Memorandum includes the Northern Ireland Division of the N.S.C.A. among the bodies able to assist local authorities in publicity and exhibitions when smoke control areas are being promoted.

ROAD CHECKS TO BE INCREASED

Convinced that diesel vehicle smoke and fumes can be steadily reduced by enforcing higher standards of maintenance, and taking off the road offending vehicles, the Society has welcomed the road-check control of the Ministry of Transport, and has urged that this should be stepped up as more trained staff became available. It is therefore gratifying to learn that the checks are to be increased during the coming months, as the Ministry now has a larger staff.

It is intended that at least one team of examiners will be working in each of the 12 traffic areas throughout the country on every working day during the summer and autumn, and this year 130,000 vehicles will be checked, compared with the 117,000 dealt with last year.

The Minister of Transport, Mr. Tom Fraser, in a statement expressed concern that examiners had to issue over 51,000 prohibition notices last year. Though many heavy goods vehicles had a better record than most others when the mileage they covered was taken into account, said Mr. Fraser, and many were well maintained, there was ample evidence that many operators failed to maintain their vehicles properly and many were in a condition that was a threat to the safety of all road users.

Operators had only themselves to blame if inconvenience and delay resulted from the issue of prohibition notices. It was no use complaining, because, if the Ministry Examiners were forced to issue a large number of notices, delays would be unavoidable before a second clearance examination could be made.

The examiners will be looking at anything that could affect the safe use of the vehicle, including overloading and the emission of excessive smoke. Some checks (as the one reported in this journal No. 131, Autumn, 1964) are devoted entirely to smoke emission.

The 1966 International Congress in London

More Details

As announced in the note on page 13 the first congress under the auspices of the new International Union of Air Pollution Prevention Associations will be held in London from 3 to 7 October, 1966. Following are more details of the programme and arrangements so far made. (They are of course provisional and there may be some amendments).

The Congress will be held in the Old Horticultural Hall, Vincent Square, Westminster, S.W.1, and the Clean Air Exhibition in the adjoining New Horticultural Hall. The Congress will open on Tuesday, 3 October, and its sessions will end on the afternoon of Thursday. The Friday will be devoted to visit to industrial plants, fuel and power installations, and other places of air pollution or historic interest.

The emphasis of the conference will be on *Air Pollution Prevention and Control in Practice* as will be seen from the outline programme:

Tuesday Morning.—Official Opening. General review of the world air pollution situation. National reports (which are invited) will be combined in continental reports to be presented by rapporteurs. It is hoped that there will be such reports from Australasia, Africa, N. America, S. America, Asia, and Europe.

Afternoon.—Papers on Domestic and other Space Heating problems, including clean air in relation to town-planning, urban renewal, etc.

Wednesday Morning.—Outstanding Industrial Problems 1.

Afternoon.—Outstanding Industrial Problems 2.

These sessions will include papers



Emblem for the Congress, symbolizing the six founder members of the International Union driving air pollution from the face of the globe

on metallurgical, ceramic, cement, chemical, power generation, and other industrial subjects.

Thursday Morning.—Papers on Gases and Fumes, including sulphur dioxide, motor vehicle exhausts, etc.

Afternoon.—Papers on control standards, regulations, legislation, international co-operation, etc. Summing up of Congress.

Procedure

An open invitation is being issued to interested organizations, government departments, and individual workers in all countries likely to be concerned. Readers who are interested and who would like to receive a copy of the invitation notice and reply form are invited to apply. The invitation is to submit proposals for papers. Such proposals with the title of the paper and a summary or abstract of its contents, should be sent in by 31 December, 1965. Proposals will be considered by a selection committee and the authors of papers accepted will be asked to send in full copies, for printing, before 31 May, 1966. It

should be noted that papers from authors unable to be present at the Congress in person will be accepted if suitable.

The papers to be presented will be printed and distributed in advance to all members of the Congress. They will be introduced, either individually by their authors, or in groups by rapporteurs, but will not be read in full at the Congress. This procedure will allow more papers to be accepted and will provide more time for their discussion. The papers and discussions will subsequently be published in book form, as after the Society's International Conference in 1959.

The papers will be printed in English and their abstracts or summaries in English, French, German, and if desirable in particular cases, in other languages.

The Congress sessions will be in

English, but inquiries are being made into the feasibility of arranging simultaneous translation into main languages. Costs may however prevent this. A registration fee will be made to cover printing and other organizational costs.

Announcements will be made in due course about social events it is hoped to arrange in connection with the Congress.

Hotel accommodation is never easy in London and prospective delegates are advised to make bookings in good time. The Society cannot undertake to make hotel reservations but will be glad to put inquirers into touch with organizations which offer this service. All inquiries about the Congress and the Clean Air Exhibition should be addressed to the Society at Field House, Brems Buildings, London, E.C.4.

Personal

The Society's President, Sir Alan Wilson has succeeded Lord Fleck as Chairman of the Nuclear Safety Advisory Committee. The Committee advises the Minister of Power and the Secretary of State for Scotland on matters which affect their functions in relation to safety under the Nuclear Installations (Licensing and Insurance) Act, 1959.

Two members of the Society's Executive Council, Mr. G. W. Dhenin of Bath, and Mr. W. L. Kay of Smethwick (who is also Hon. Secretary of the East Midlands Division) have been elected as Fellows of the Royal Society of Health.

Mr. Alan Gilpin, formerly Chief Public Health Inspector, Wallasey and since 1961 a planning engineer with the C.E.G.B. in London, has been appointed Director of Air Pollution Control for the State of Queensland, Australia. He is the author of the book "Control of Air

Pollution", published by Butterworths.

Mr. John L. G. Longstaff, formerly of Allied Ironfounders Ltd., has joined the staff of the Society as Exhibitions and Advertisements Officer.

Clean Air "Too Late"

Smoke abatement has come too late for some Sheffield children, says the city's school health service report for 1964. Chest ailments are being found in children of ten.

"The relationship between pollution and chronic bronchitis in middle-aged and elderly adults, has long been recognised," the report states.

"But it comes as a shock to realise that children living in polluted areas of the city are already showing signs of chest damage by the age of 10.

"Very rapid strides are now being made in the clearing of industrial and domestic smoke, but for these children clean air has already come 10 years too late."

CLEAN AIR POWERS OF LOCAL AUTHORITIES

Bill to Extend Introduced by Robert Edwards, M.P.

In the House of Commons on August 3, Mr. Edwards sought, and was given, permission to introduce a Bill to amend existing legislation to give local authorities more powers to control air pollution. Mr. Edwards spoke as follows:

I beg to move,

That leave be given to bring in a Bill to give further powers to local authorities to take action against the pollution of the air.

The genesis of this Motion had its origin in my constituency about five years ago when the Minister of Housing and Local Government, against the wishes of the local authority, granted permission to a large industrial undertaking to extend its production. As a consequence, the air in a vast area of my constituency has been polluted and hundreds of good people have an unremitting struggle to keep dust, filth and smoke out of their homes. Their lives are becoming a nightmare. When the wind is in a certain direction, the local school has to close its windows and the children have to be brought in from the playground. We have lost control of our environment, and when man loses control of his environment he becomes a slave. It is time that we gave local authorities power to prevent a situation like this from developing in other parts of the country.

Far be it from me in this short speech to denigrate the value of the Clean Air Act, but in the 2,000 smokeless areas throughout the country hundreds of tons of coal are sold against the very principles for which the Clean Air Act was passed. Hundreds of tons of bituminous coal are being sold in smokeless areas and, although local authorities have power to prosecute householders, they have no power to act against coal merchants.

Apart from the areas covered by smokeless zones, great industrial centres are having to face an increasing problem of air pollution. Local

authorities do not have adequate power to deal with the problem. We take great pains to guarantee that our water supplies are clean and pure and we must make the same efforts to see that the air we breathe, air which we consume much more continuously to live than we consume drinking water, is pure and clean.

The pollution of our air is committed by man and man cannot easily remove himself from the areas which he pollutes. He has to work, live, sleep and play often enough in the areas where his industrial activities pollute the atmosphere. At least we ought to be able in this century to get rid of sources of air pollution and prevent new sources from arising. We ought to be able to amend our legislation in such a way that we can reduce this hazard which puts hundreds of people into hospital beds, which makes the lives of hundreds of thousands of people a misery from bronchitis and other chest diseases, and which sends many citizens to a premature grave.

For that and many other reasons which hon. Members will know from their own experience, I hope that the House will give me permission to bring in a modest Bill to amend existing legislation so as to give local authorities more power to guarantee the health of the people whom they represent.

Question put and agreed to.

Bill ordered to be brought in by Mr. Robert Edwards, Mr. Frank Allaun, Mr. Ioan L. Evans, Mr. Owen, Mr. Rhodes, Mr. A. Henderson, and Mr. Bradley.

Clean Air (Further Provisions)

Bill to give further powers to local authorities to take action against the pollution of the air, presented accordingly and read the First time; to be read a Second time upon Friday, October 29 and to be printed. [Bill 207].

Air Pollution in Parliament

QUESTIONS TO MINISTERS

Motoring Offences (Smoke and Fumes)

Mr. Woodhouse asked the Secretary of State for the Home Department whether he will introduce legislation to empower police constables to impose on-the-spot fines, subject to appeal, on drivers whose vehicles infringe Regulation 79 of the Construction and Use Regulations 1955 by emitting smoke and fumes.

Miss Bacon: I assume that the hon. Member has in mind Regulation 80 of these Regulations. In my right hon. and learned Friend's view the methods of enforcement already available are preferable to that suggested.—16 June, 1965.

Exhaust Fumes

Mrs. Joyce Butler asked the Minister of Transport what study he has made of the United States Bill to reduce air pollution from car exhausts starting with the 1968 models of United States and imported cars; and if he will introduce similar regulations in this country.

Mr. Tom Fraser: My technical officers are continually studying measures taken in the United States to combat the problem of air pollution from motor vehicles. Legislation in the U.S.A. is directed largely at a form of pollution which is not significant in the different conditions here. Similar regulations, therefore would not be appropriate; but if our studies disclose the need for greater control of motor vehicle emissions and practical means of achieving it are available, I will certainly consider making suitable regulations.

Mrs. Bulter: While thanking my right hon. Friend for that reply, may

I ask whether he appreciates the extent of the public and medical concern about this form of air pollution here? Since it will be impossible to export British cars to the United States after 1968, and to California and probably some other States after next year, unless they have these anti-pollution devices, would it not be a golden opportunity for the Government to take action which would benefit public health here and would help to facilitate car exports?

Mr. Fraser: We should take all reasonable actions to protect public health in this country, but we must not get out of perspective the kind of legislation introduced in another country. In California as from 1 January next year new motor vehicles having engines of 4.2 litres or more will be required to be so constructed that the amount of noxious gases emitted will not exceed certain specified levels. But there are not many motor cars in this country with engines of that size, and our exporters of engines of that size to the United States will take appropriate action to ensure that they are not kept out of that market after 1 January next year.

Mr. Dudley Smith: Nevertheless, is the Minister not aware that there is concern in America that fumes from motor cars and heavier vehicles are a contributory cause of lung cancer? Will he not consider the matter again and consult his right hon. Friend the Minister of Health in framing future legislation?

Mr. Fraser: Yes, but the immediate proposition which the hon. Member put to me is much more a matter for my right hon. Friend the Minister of Health.—16 June, 1965.

Information Exchange

Mr. John Hall asked the Secretary of State for Education and Science whether there is an exchange of information between the Air Pollution Research Unit and similar research units in other countries; what harmful substances have been identified in air pollution by research workers in this and other countries; and what research has been carried out into the effect of all those harmful substances by this country.

The Joint Under-Secretary of State for Education and Science (Mr. Denis Howell): There is very close contact and frequent exchange of information between the Air Pollution Research Unit of the Medical Research Council and other national and international agencies in this field. A great many substances, a few of which are potentially harmful to human beings, have been identified in air pollution and their relevance to human health is kept under constant scrutiny and examination.

Information about work being undertaken in this general field in the United Kingdom is available in a report of the Warren Spring Laboratory, entitled "The Investigation of Air Pollution"; the annual report of the Medical Research Council; and in "Scientific Research in British Universities and Colleges"; all published by Her Majesty's Stationery Office.—*24 June, 1965.*

Cost of Research

Mr. John Hall asked the Secretary of State for Education and Science how much has been spent in each of the last five years on research into air pollution by the Air Pollution Research Unit of the Medical Research Council.

Mr. Denis Howell: With permission, I will tabulate this information in the Official Report.

Mr. Hall: It is a little difficult to comment until I see the figures

published. May I nevertheless ask whether the amount is anything like the £1 million to be spent this year by the Tobacco Council to examine the relationship between smoking and health? If it is not so large, why not?

Mr. Howell: It is nothing like that. It has gone up from about £21,000 in 1960-61 by about 50 per cent to £32,800 for 1964-65.—*24 June, 1965.*

Vehicle Pollution and Health

Mr. Dudley Smith asked the Minister of Health what official consultations he has had over the harmful effects to health of air pollution, particularly fumes from heavy vehicles; what legislation he envisages to counteract this; and if he will make a statement.

Mr. K. Robinson: There is close and continuous consultation through the Clean Air Council and the Inter-departmental Committee for Air Pollution Research. I am advised that there is at present no evidence that diesel engine fumes are injurious to health. Any question of legislation on air pollution generally is for my right hon. Friend the Minister of Housing and Local Government, and on motor vehicle fumes for my right hon. Friend the Minister of Transport.—*19 July, 1965.*

Exhaust Fumes—Upward Discharge

The Earl of Dalkeith asked the Minister of Transport whether he will introduce the appropriate regulations or, if necessary, legislation at an early date to ensure that the discharge of exhaust fumes from motor lorries is in an upward direction from a point no lower than the roof of the vehicle's cabin in order to lessen the risk of semi-asphyxiation of other road users, particularly in traffic jams, and to improve visibility for overtaking vehicles.

Mr. Tom Fraser: No. The vertical discharge of vehicle exhaust gases at cab roof level has positive disad-

vantages. Many of the constituents of these exhaust emissions, especially diesel oil smuts, are heavier than air and are better blown out near the ground than on to the heads of passers-by or into first-floor windows. Further, the shape of many vehicles is such that, when in motion, the air-flow produced would draw exhaust emissions down at the rear on to following vehicles.

There is no technical reason why diesel engined goods vehicles should not be prevented from emitting excessive smoke. The road-side "spot checks" carried out by my technical officers and other preventive measures are designed to reduce the incidence

of diesel smoke emission.—*23 July, 1965.*

Smoke Control—London

Mr. Longden asked the Minister of Housing and Local Government which are the three local authorities in Greater London which are not carrying out smoke control programmes.

Mr. MacColl: Since 1 April, when the reorganisation of local government in Greater London took effect, all local authorities in the area have been carrying out smoke control programmes. The former authorities which were not doing so were East Ham, Surbiton and Ruislip-Northwood.—*2 August, 1965.*

WARREN SPRING OPEN DAYS 1965

The representatives of the press were invited on 22 June to a preview of Warren Spring Open Days when, as in previous years, the Laboratory (now part of the Ministry of Technology) puts on view to the invited guests the exhibits which illustrate the various fields of research programme undertaken there.

After a hospitable welcome from the Director, Dr. C. C. Hall and his staff, it was gratifying to find that all the exhibits of the Air Pollution Division were located together in a separate marquee where an excellent display enabled the visitors to comprehend the air pollution problems with which the Laboratory is particularly concerned.

One of such problems is the dispersion in towns of pollutants both from single chimneys and from the town as a whole. A balloon, like a small scale barrage balloon, is being used to measure the vertical distribution of air pollution (represented by a harmless fluorescein dye tracer) at heights up to 500 feet. The balloon is equipped with devices which record the pollution and temperature gradients and the wind speed and turbulence.

St. Alphrege's House, London Wall, is among several buildings in London which have been instrumented. Three-hourly and continuous readings are taken in an effort to find out the effect tower blocks and tower block developments can have on air pollution.

The information on dispersion, which the Laboratory is assembling, will enable the designers of new towns and developments to be aware of the air pollution problem and to know what steps can be taken at the planning stage to minimize the problem.

Research on the problem of removing sulphur oxides from flue gases continues with experiments to find an economic catalyst for absorbing the waste gases by a dry absorption method.

The Combustion Engineering Association, in conjunction with the Institute of Cost and Works Accountants, is to hold a conference at the Hotel Majestic, Harrogate, on 17 and 18 November on the subject of "Industrial Energy Developments and Costing". Details, programme and application forms may be obtained from the Director of the Association at 70 Jermyn Street, London S.W.1.

INTERNATIONAL SECTION

U.S.A.

WHAT THE PEOPLE THINK

U.S. Public Opinion Survey on Air Pollution

MUCH research has been and is being done on what may be called the science of air pollution—its composition, measurement, behaviour in the atmosphere, and its medical and other effects. It is surprising that, for what is essentially a social problem, there should have been so little investigation into the reactions and opinions on air pollution of the people who are affected by it, and whose well-being is the main objective of the drive for clean air in many parts of the world.

It is because so little has been done in this important field that we welcome, and are giving a fairly full review of, a report from the U.S.A. that has just been published. It is a detailed account of a survey made solely to determine public opinion on air pollution, and, as far as our knowledge goes, is the most comprehensive so far conceived and carried out. Both in its findings and in the methodology used it is of much more than local, or even U.S.A. interest, and it provides a valuable groundwork for any other surveys that may be attempted elsewhere.

The full title is *Public Awareness and Concern with Air Pollution in the St. Louis Metropolitan Area*. The work was conducted by the Public Administration and Metropolitan Affairs Programme of the Southern Illinois University for the Division of Air Pollution, U.S. Public Health Service. The report is published by the U.S. Department of Health, Education and Welfare. Co-operation was given

by the National Opinion Research Centre, Chicago, in designing the sample population and in constructing the survey questionnaire.

The area covered by the survey was the city of St. Louis and the adjoining St. Louis County, Missouri, and, across the Missouri river, the two Illinois counties of St. Clair and Madison.

The first part of the 80 page report describes the sample design and the factors taken into account. The whole area was broken down into suitable sections, and each of these into sub-areas. In each of the last the sample was randomly selected, the "household" being the unit. One adult respondent was selected from each sample household. Since persons with differing roles in a household look on community problems differently, the sample respondent was also selected randomly. Taken into account in the analysis of the replies were the geographical and racial distribution of population, owner-occupation, family income, educational attainment, and length of residence.

The sequence of questions in the household interview was designed to obtain first the respondent's overall attitude towards his neighbourhood and community without calling any particular attention to air pollution. The respondents were then asked to indicate the relative seriousness of different community problems, including air pollution. Only after examination of general community attitudes did the questionnaire focus

on air pollution itself. This prevented the respondent's being sensitized to air pollution prior to his fixing the problem in perspective.

The Survey Results

The first set of questions was on things liked in the city or township, by sub-area. Here, and in the further tables quoted, we give the percentage shown for the total area only. The report gives also the figures for the city and the counties. The percentages do not total 100·00 because many respondents gave more than one answer to the question.

<i>Things Liked</i>	<i>Total Area</i>
	<i>%</i>
Physical aspects	44·1
Access to schools, church and recreation	43·8
Characteristics of people ..	40·2
Access to shopping facilities ..	22·0
General convenience and accessibility	16·0
Public service and administration	15·8
Access to transportation ..	13·9
Always lived here or family lives here	13·9
Employment availability-cost of living	12·4
Clean air	3·5
Other and general liking ..	2·8
Weighted base (100%)	1384

The appreciation for clean air fell to 0·3 per cent in St. Louis City, and rose to 6·3 per cent in the Illinois counties.

From this the questionnaire went on to ask about the things disliked, with the following results:

<i>Things Disliked</i>	<i>Total Area</i>
	<i>%</i>
Physical aspects	35·0
Public services	27·1
General accessibility	25·0
Characteristics of people ..	24·3
Taxes	14·8
Public administration and government	11·9
Employment and cost of living	10·8
Traffic and parking	9·9
Air pollution	8·5
Vice	6·1
Other and general dislikes ..	1·8
Weighted base (100%)	1088

In Illinois air pollution dislike rose to 15·2 per cent—the fourth item from the top—and in St. Louis city it was only 5·8 per cent. The report compares this with the “things liked” list and thinks that more study is needed to determine the cause of the relatively low sensitivity to air pollution in St. Louis city. “One possible explanation”, it suggests, “is that persons who have such sensitivity select residences in those suburban areas where air pollution is less of a problem.”

The rating of city or township among whites and non-whites is examined and discussed, and the tables indicate that non-whites are considerably less satisfied than are the whites, but that their attitude to air pollution is somewhat obscured by more pressing social problems.

Then comes a set of questions on how problems are rated in terms of their seriousness, both in the neighbourhood and in the city as a whole. The problems cited were (1) lack of recreation areas and programmes, (2) unemployment, (3) air pollution, (4) race problems, (5) garbage and refuse disposal, and (6) juvenile delinquency. Each of these is grouped as being considered very serious, somewhat serious, or not serious.

For each of these problems, and in every area, the problem is regarded as less serious in the neighbourhood than it is citywide. For air pollution itself, taking the total response, the figures were:

	<i>Neighbourhood</i>	<i>City</i>
	<i>%</i>	<i>%</i>
Very serious	10·4	14·0
Somewhat serious	16·9	21·7
Not serious	72·6	64·3

The other problems show a similar spread of concern, and overall air pollution ranks third in seriousness as a city or township problem and second as a neighbourhood problem.

A further question on what is regarded as the most serious problem showed that air pollution was so

regarded by 15 per cent of the total metropolitan area population.

Effectiveness of Officials

A further set of questions was on opinion about the effectiveness of officials in dealing with the various problems that had been discussed. The replies showed that the higher the rating of the city or township as a place in which to live, the higher was belief in the effectiveness of officials. "As the rating of the city declines", concludes the report, "so does the proportion feeling that such leadership is effective." Omitting the intermediate "good", "fair" and "poor" ratings, the two extremes gave the following response:

	Rating	
	Excellent	Very Poor
Very effective	42.1	—
Somewhat effective	47.3	15.3
Somewhat ineffective	6.4	35.7
Very ineffective	4.2	49.0

Complaints

The questionnaire then turned to complaints as an indicator of real feeling about problems. We quote only the response for air pollution, but the same pattern is repeated, with but small variations, for each other problem and in each sub-area.

Did not wish to complain	..	85.6
Wished to complain but did not		11.1
Wished to complain and did	..	3.3

In Illinois counties those who did complain rose to 6.6 per cent. It was found that the number of complaints appeared to be related to knowing to whom to complain, and the following comment is made:

"Complaining appears to bear no relationship to the sex of the respondent, or to political preference. Educational attainment, however, shows a rather interesting relationship. Persons with either very low or very high educations do not complain as often as those with moderate schooling. This might be accounted for as follows: persons with low education, while living in areas having the

problems, are afraid to complain, do not know to whom they should complain, or even that such a person exists; persons with high education live in areas not having the problems, and therefore have no need to complain.

Specific Attitudes to A.P.

To get at the specific attitudes of the sample population on air pollution and, if so, in what circumstances, they were questioned about their health and whether they thought air pollution affected health. One of the questions in this group was on how respondents had been affected by air pollution. For the total area the percentage replies were:

"Not bothered at all"	..	..	53.9
"Bothered somewhat"	..	..	37.4
"Bothered quite a lot"	..	..	8.7

Personal Circumstances

An interesting question on how people are affected by air pollution in their living conditions produced the following—again quoting only the "total" column, in percentages:

<i>"Is Affected" Response</i>			
How often you clean curtains and drapes	..	..	29.6
Care and upkeep of house	..		28.9
How often you wash your car			23.0
Reputation of area in which you live	..	..	22.9
Personal cleanliness	..	..	20.9
Price your home would sell or rent for	..	..	18.3
Where household head chooses to work	..	..	17.0
Where you shop	..	..	11.4
Weighted base (100%)	..	..	1452

Health

The survey attempted to gauge the feeling on the relation of air pollution to health. Three questions were asked: *How would you rate your health at the present time—excellent, good, fair, poor, or very poor? Do you have any of these health problems—heart trouble, lung trouble, allergies? Do you think air pollution harms people's health?*

Of those who said they had lung trouble, 37.2 per cent were not "bothered" at all by air pollution, 31.4 per cent were bothered somewhat, and 31.4 per cent were bothered "quite a lot". For heart troubles the figures were, respectively, 41.7, 43.9 and 14.4 per cent; and for allergies the figures were 30.4, 53.0 and 16.6. Nine out of ten respondents thought air pollution harmed health; three quarters of the remainder with little education made the connection, and virtually all the more highly educated assumed health injury.

What does Air Pollution Mean?

Asked to say what the term "air pollution" meant to them, the definitions that were given are revealing (total area percentages):

Odour (fumes)	56.0
Smoke	45.9
Dust and dirt	19.0
General contamination	18.1
Motor vehicle exhausts	15.6
Chemicals (insecticides)	12.3
Radiation	10.9
Other unhealthy conditions (germs)	10.1
Fog and smog	9.6
Pollens	4.2

Following this open-ended question on the respondents' definition of air pollution, each person was asked: *What do you think people in this area think of when they speak of air pollution? Would you guess they mean...* Then follows listed definitions, as follows, with the "yes" response:

Frequent bad smells in the air ..	73.4
Too much dust and dirt ..	62.8
Frequent nose or throat irritation	55.5
Frequent irritation of the eyes ..	46.5
Laundry getting dirty on the line	44.8
Frequent haze or fog	33.0

Following his volunteering causes, each respondent was asked: *Do you think factories (etc.—as list below) are important or not important in causing air pollution that affects this neighbourhood?*

The answers were as follows (total area percentages):

Factories	57.6
Buses and trucks	45.3
Odours from sewage	44.6
Street and road dust	41.2
Autos	40.4
Ragweed and other causes of hay fever	34.4
Burning of leaves and trash in yards	29.2
Smoke from houses	27.9
Garbage and refuse dumps	27.1
Businesses and other buildings ..	22.2

The Influence of Communication

The next series of questions deals with the relation between various sources of information and the perception of air pollution as a problem. Respondents were asked: *Have you ever heard about air pollution from any of these sources?* Then followed the list of sources, as given below with the "yes" percentages:

Newspapers	67.8
Television	49.1
Magazines	44.4
Friend or relative	34.4
A Doctor	14.0
Someone in local government ..	12.3
Community wide citizen's organization	11.1
Neighbourhood organization ..	10.4

Further details, given in the report, reveal that equal proportions of people, hearing and not hearing about air pollution in the mass media (the first three items above), note the problem or the absence of it in their neighbourhood. This lack of relationship disappears when the communication is of a more personal nature. For all personal contact situations, except with local government members, communication is highly related to a conception of air pollution as serious.

From this follows inquiry into the actual interest in air pollution. Interest varied according to the level of pollution in the different areas, but for the total area the following percentages are given:

Exceptionally high (wanted to talk at length about subject)	6.0
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High (made spontaneous comments but could be kept to the point)	26·0
Average (didn't volunteer comments)	40·6
Low (seemed to know or care little about subject)	27·4

Administration and Action

The final part of the questionnaire is concerned with administrative action to control pollution—is enough being done, who should be responsible (city, county or federal), and so on. These questions and their answers relate specifically to local conditions, and are therefore not detailed here, except for a most interesting question of willingness to pay for air pollution control. For the whole area 85·1 per cent expressed a willingness to pay \$1 in additional taxes for control; and 66·4 per cent were willing to pay \$5 cost of living increase for control. This cost of living increase is explained as the cost that might have to be borne because companies had to spend money to control their air pollution.

The report includes an appendix reproducing the questionnaire in full. To complete this for each person questioned must have taken a considerable time and must have stretched his or her patience and goodwill to the full.

There is also an appendix on the correlation between perception of air pollution by the sample population and air sampling instruments. Two graphs are given, showing respectively the correlation between suspended particulates and awareness of pollution (0·80) and between sulphur pollution and awareness (0·71). Both cases show—not surprisingly—that the greater the pollution the more people are aware of it.

OTHER U.S. REPORTS

The U.S. Department of Health, Education, and Welfare announces the publication of a report designed

to assist State and local air pollution control agencies and the chemical industry in planning and evaluating measures to control atmospheric emissions from sulphuric acid manufacturing plants.

The report—based on a joint study by the Division of Air Pollution of the Public Health Service and the Manufacturing Chemists' Association, Inc.—presents a summary of current air emission control practices in sulphuric acid manufacturing and indicates techniques available for control of all major types of emissions from sulphuric acid plants. The joint study was the first in a co-operative programme of studies of atmospheric emissions from selected chemical manufacturing processes. The manufacture of sulphuric acid was chosen for the initial study because it is one of the more important segments of the chemical industry in terms of production, because it involves plants in many parts of the country, and because of its potential significance in community air pollution problems.

Copies of the report are available from the Manufacturing Chemists' Association, Inc., 1825 Connecticut Avenue, N.W., Washington, D.C. 20009, and from the Division of Air Pollution, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20201.

Cincinnati

The Department has also issued a comprehensive report on air pollution concentrations and patterns in Cincinnati, Ohio, one of six cities in which the Service's Division of Air Pollution operates a continuous air monitoring station.

Data presented in the report are based on air pollution measurements made at the Cincinnati station during 1962 and 1963. More than 829,000 separate measurements recorded during the period were fed to electronic computers at the Public Health Service's Robert A. Taft Sanitary Engineering Centre in Cincinnati to provide information on minimum,

average, and maximum pollutant concentrations; daily and seasonal variations in pollutant levels; and interrelationships among various pollutants.

The Cincinnati station, like the five others in the Continuous Air Monitoring Programme (CAMP) automatically measures and records levels of six common gaseous pollutants—sulphur dioxide, nitric oxide, nitrogen dioxide, oxidant, hydrocarbons, and carbon monoxide. Measurements are also taken and recorded for suspended particulate matter and for the degree of soiling potential of suspended particulates in the air.

REPORT FROM NEW YORK

The 1964 Annual Report of the Department of Air Pollution Control states in simple and forceful terms and by means of vivid photographs, the existence of an air pollution problem in the City of New York. It also emphasizes that this man-made problem, caused, (as elsewhere) by the pursuit of a higher standard of living, must be solved urgently by everyone concerned. Although some progress has been achieved in the prevention and control of pollutants during 1964, the 320 square miles of the City of New York averaged 60 tons of sootfall per square mile per month, while the levels of particulate and gaseous pollutants in general remained high.

New Yorkers are urged by the Report to co-operate with regional, state and federal programmes aimed at cleansing the air. The Department, for its part, has applied for a Federal Programme Grant to expand its control activities. Moreover, the new air pollution control code promulgated in 1964, provides the Department with teeth for control and enforcement; it is too early however to predict the effectiveness of what "must necessarily remain a factor of will, budget and manpower".

(Report obtainable from: Department of Air Pollution Control, 15

Park Row, New York, NY 10038, U.S.A.)

S. Smith Griswold

Mr. Griswold, who has headed the Los Angeles County air pollution control programme for more than a decade, has accepted appointment as Chief of the Abatement Branch, Division of Air Pollution, Public Health Service, U.S. Department of Health, Education, and Welfare.

Mr. Griswold will direct Federal activities concerned with the abatement of interstate and certain intrastate air pollution problems in accordance with the provisions of the Clean Air Act of 1963.

Czechoslovakia

Symposium on SO₂ and Fly Ash

International Symposium on the Control and Utilization of Sulphur Dioxide and Fly-Ash from the Flue Gases of Large Thermal Power Plants at Liblice near Prague, 25-31 October, 1965.

The National Commission for the Development and Co-ordination of Science and Engineering, the Czechoslovak Academy of Sciences, the Czechoslovak Scientific and Technical Society and the Central Board of Power Engineering are jointly organizing this Symposium which will be held in the House of Scientific Workers under the chairmanship of Professor Henrick Ramic.

The problems to be discussed at the Symposium are classified into five groups, the scope of each group being limited by the selected themes:

1. The effect of coal composition and methods extraction, preparation and combustion on the amount of effluent sulphur dioxide and fly-ash.
2. Desulphurization of flue gases.
3. Scattering of emitted sulphur dioxide and dust as affected by meteorological conditions.

4. Utilization and disposal of deposited fly-ash.
5. The effect of effluents from large thermal power stations on living environment.

The official languages will be Czech, English, Russian and German and publication of Proceedings is planned for April 1966.

Delegates are to be taken on an inspection tour of the North Bohemian coal field district which is badly afflicted by noxious effluents. In direct contrast a sight seeing trip is planned through the spa region of West Bohemia, accommodation being provided at Carlsbad. Social and cultural activities are being arranged and the organizational committee expects a fully representative forum of international experts to participate. Scientists and engineers from all industrially advanced countries have been invited to take part in the proceedings.

Proceedings of the 1st National Conference on Aerosols, held near Prague, October 1962.

"The atmosphere of many industrial areas and large cities is polluted by harmful emissions from factories and traffic to such an extent as to their effect on the health of the population in the present time." This quote from the proceedings of the above conference, published this year by the Czechoslovak Academy of Sciences, highlights the importance of continuous research into the fundamental nature of one of the main constituents of air pollution, Aerosols. These are solid or liquid particles of minute size, dispersed in a gaseous medium, and form the subject of over 100 papers in French, German and English read by European and American scientists at the conference.

This 950 page volume has chapters on radioactive, industrial and agricultural Aerosols, and on their biological and chemical effects. It is recommended to all those engaged in basic studies on the problems of atmospheric pollution.

Australia

SYDNEY SMOG

The *Sydney Morning Herald* of 6 August, 1965 in its leading article deals with two aspects of the city, both vividly illustrated. One is the repetition of serious smog episodes, the worst, experienced on 5 August enveloped the city in a dense veil that was only dispersed when rain fell in the afternoon. It came at a time when preparations were being completed for a Clean Air Conference of five world authorities on air pollution. The conference is being sponsored jointly by the New South Wales Department of Health and the University of New South Wales.

The other aspect is the new city plan for the development of the Circular Quay area. It has been prepared by the City Council and submitted to the Minister for Local Government, Mr. P. H. Morton and shows a low, long shopping pavilion which will have a pedestrian mall and the inevitable new road for the increasing vehicle traffic *behind* the development.

Commonwealth

RESEARCH ON A.P.

A recently issued directory of establishments in the Commonwealth engaged on air pollution research lists 67 centres in the United Kingdom devoted to specialist projects related to atmospheric pollution research. Eight Universities, including a measurement of airborne smoke particles study led by Professor P. C. G. Isaac at Durham, are listed and the multiplicity and variety of activity detailed in the publication would suggest that no major field of research is being neglected.

The United Kingdom section was compiled by Mr. J. Parker of Warren Spring Laboratory and the publishers appeal for additional information from the Commonwealth for subsequent editions of the directory which is not available to the general public. It is issued by the Commonwealth Scientific Liaison Office.

Breath of Life

The Breath of Life. By Donald E. Carr. pp. 175. Gollancz, London, 21s. net.

This book, from America, is a vigorous, excited, and informative attack on air pollution. It is curiously difficult to sum it up. Obviously written for the general public, it is on the one hand painstakingly breezy and often facetious, while on the other hand it does contain much of interest and a great deal of information, some of it quite out of the way.

It discusses the origins and nature of the air we breathe, gives a short history of air pollution of all kinds, including odours, has a chapter on "the disasters", and then considers in some detail the pollutant that Mr. Carr is very concerned about—carbon monoxide. This chapter, believe it or not, is called "The Red Faced Stiffs". And another, cryptically entitled "The Villain with a Sharp Knife" turns out to be on ozone and its dangers. There is a short and provocative chapter on cancer and air pollution, from which we quote just one sentence: "We are not yet in a position to blame cigarettes for killing throngs of nonsmoking bystanders, including orchids".

There is a full bibliography, and no doubt most of the facts in the book are accurate and the views sound. But there are errors in areas with which we are familiar, such as the atrocious spelling of John Evelyn's "Fumifugium" as "Furnifogium", and a mention of the British Clean Air Act being passed in 1958. Also, the word "Smog", though correctly attributed to Des Voeux, dates from 1905 and not 1911, as reference to our *Clean Air Year Book*, or to the Oxford Dictionary, would have told the author. And is it true—if so it is new to us—that during the London smog of 1952 (oddly said to be called "The Black Fog") scores of people were drowned by slipping into the river,

and that 50 bodies were brought into a mortuary from one small park in south London?

In the final chapter on "What could be Done" the author concludes that in non-coal-burning communities the main cause of trouble is the motor car. He concentrates his fire on this source of pollution and hits hard at the indifference of the American motor industry. "I believe", he says, "the desultory attitude of the great automotive manufacturers in regard to smog is a national scandal of major proportion".

There are, he points out, various possible alternatives to the present automobile engine, on which more research and development are needed, "although unfortunately they run counter to the lethal interests of Detroit". He suggests improved diesel engines, the gas turbine engine and the fuel celled vehicle as among the possible answers. This chapter is particularly well worth reading—as indeed is the whole book, even though it does rasp painfully in parts.

NEW GAS FILMS

A programme of new films was presented by the Gas Council in the Vickers House Cinema on Thursday, 15 July, 1965. The first film to be screened was titled "Summer In Winter" and the audience were reminded of the warmth and sense of opulent well-being that some of the new gas fired home heating systems can provide in new or existing domestic dwellings.

The next film, "Under the Sun", illustrates the role of the sun in providing most of the heat the earth requires. In ten minutes the origin of fuels is effectively explained and the ever mystifying problem of climatic variations reduced to simple proportions by means of animated models.

The first half of the programme concluded with a longer feature, "Gas In Modern Housing" which

describes the Se-duct system of gas heating, stressing the flexibility and labour-saving advantages for space heating, domestic hot water, incineration and other purposes. There are interesting clean air aspects of this film but as in the previous two subjects no reference is made to the Act or the need to intensify our efforts to ensure that all domestic dwellings have smokeless appliances and heating systems.

After the interval Mr. Camp of the Gas Council introduced the "big picture", the documentary "Saharan Venture" which tells the story of the project from its early days and, apart from the irritating musical score which would seem to combine the worst features of Algerian folk music with a modern form of afternoon tea, the film manages to be gripping and entertaining throughout. The Gas Council can feel some justifiable pride in being entirely responsible for the production of this film and for conveying the immensity of the operation. A longer version entitled "The Methane Story", which gives a chronological account of the entire scheme, with emphasis on the methods and techniques employed is now available and should give an even greater emphasis to the scope of this film-making project which used over 25 film cameras in the Sahara Desert, Northern Ireland, England, Scotland and on ships at sea; the latter sequences being particularly impressive and admirably conceived.

Although the rather intensive promotion of gas in the films "Summer In Winter" and "Gas In Modern Housing" would rule them out for most general showings designed to promote clean air both "Under The Sun" and "Saharan Venture" can be recommended unreservedly.

Summer In Winter, 13 minutes.

Under The Sun, 10 minutes.

Gas In Modern Housing, 17 minutes.

Saharan Venture, 28 minutes.

Inquiries should be made to: The Gas Council Film Library, 4-5 Grosvenor Place, London, S.W.1.

Frank Wilkinson

Mr. Frank Wilkinson, whose paper at the N.S.C.A. Harrogate Conference last year will be remembered, has recently retired as Marketing Member of the National Coal Board. His last official act was to declare open the new Rickmansworth branch of J. H. Sankey and Sons Ltd., the builders merchants, on Tuesday, 29 June, 1965.

Mr. A. C. Hazel, Managing Director of Sankey's, in thanking Mr. Wilkinson revealed that he was in fact opening the branch on his way home to enjoy a well deserved retirement. After Mr. Hazel had paid tribute to the valuable work being done by the National Coal Board and the British Coal Utilisation Research Association to develop and popularize modern heating systems, Mr. Hatcher, the branch Manager made a presentation to Mrs. Wilkinson, who with Mr. Wilkinson, led the guests on a tour of inspection of the premises.

"Hot Line" for Complaints

Members of Stockton Town Council were told last night in minutes of the health committee that I.C.I. has now installed a special telephone line to receive complaints of atmospheric pollution.

Members and health officials have been given the number of this special "hot line", but it will not appear in the telephone directory and will not be made public.

Other equipment installed during recent months to reduce atmospheric pollution has been demonstrated to representatives of Tees-side local authorities by I.C.I. senior managers during a visit to the Billingham factory.

The local authorities agreed that substantial progress had been made to reduce pollution, but it is their intention to continue to press for further improvements to be made as soon as possible.

A statement issued on behalf of the local authorities by Mr. J. B. Haworth, Town Clerk of Stockton, said that the company had agreed that a further meeting should be held to keep the local authorities in the picture. — *Evening Gazette, Middlesbrough*, 28 July, 1965.

*The outloading bunkers
over railway, at Bevercotes*



COLLIERY FOR TOMORROW

Automated — and Smoke free

FROM the specialist point of view of this journal the value of the new collieries that are coming is their freedom from smoke and dust emission; and more generally, because clean air is linked so closely with the efficient use of our fuel and power resources we welcome them for the technological advances they embody. These are not merely advances in producing coal more cheaply but also in the ending of the primitive pick-and-shovel era of mining, with all its danger, dirt and sweat.

An impressive prototype for the mine of the future is to be seen at the Bevercotes Colliery in the north Nottinghamshire coalfield, which was recently visited by a large press party. Originally this colliery was planned to produce about $1\frac{3}{4}$ million tons of coal per year with an overall output per

manshift of around 3 tons and a manpower of approximately 2,000.

Limited coal production began in 1961, but had to be discontinued. Then, in 1963, it was decided to reopen the colliery with the application of the latest remote control techniques. It is now anticipated that there will be an output per year of saleable coal of $1\frac{1}{2}$ million tons, with an output per manshift of 8 tons and a manpower force of 770.

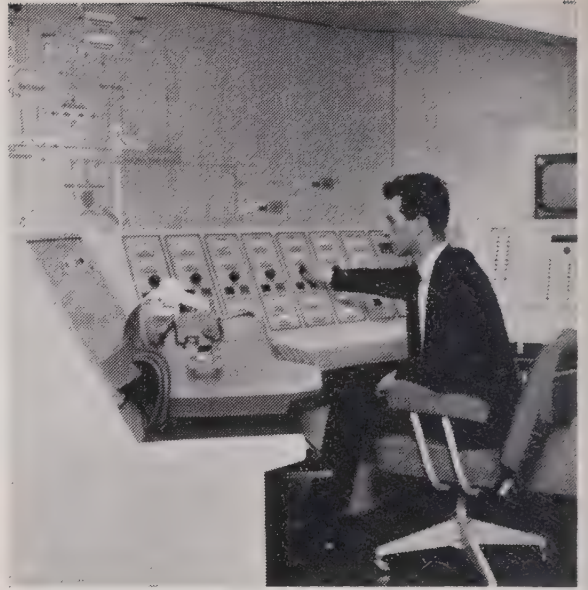
This remarkable advance is due to extensive remote control schemes, which cover all operations—the cutting of the coal at the five longwall faces, loading and underground transport, raising, the coal preparation plant, the outloading to rail wagons, and ancillary services. Each sector has its own manned control point, and all are under the overall direction

of a central controller located on the surface, with related sectors linked together for information and instructions. The visitors were fortunate in being able to inspect a surface assembly, in full working operation, of the remotely controlled longwall face (ROLF) equipment.

To describe this key operation, especially for readers who are technically interested, we may here quote from the description in the N.C.B.'s own brochure on the colliery:

Production is to be obtained from five longwall faces each approximately 270 yards long with two gate roads. They will be supported over the power-loaded length by remotely operated powered supports.

The power loaders will be shearer loaders taking a 24-in. strip. The cutting horizon is determined by a radioactive source, leaving a pre-determined thickness of floor coal. The coal is fed from the machines on to 24-in. hydraulic armoured flexible conveyors running the whole length of the faces and delivering on to a stage loader in the main gate. Stable hole



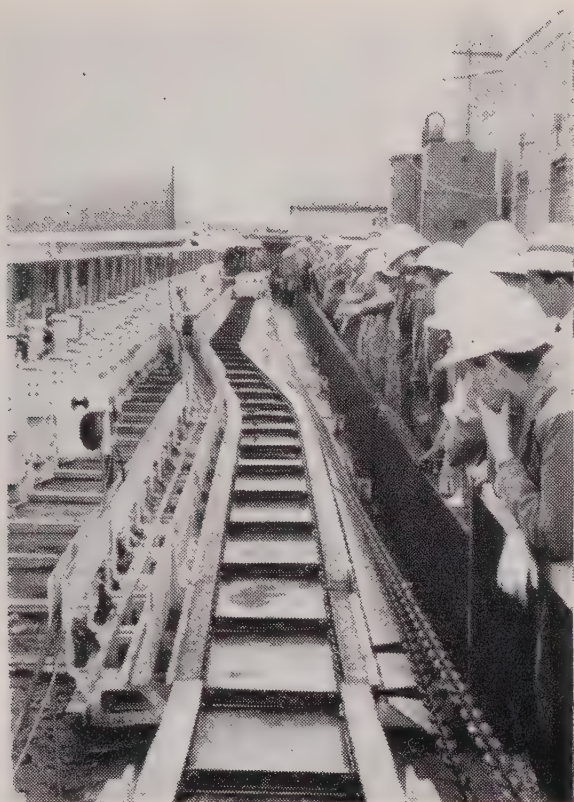
The central control room at the pithead

machines and ripping machines will be used at each of the two gate roads and these machines will be integral with the powered gate end support system advancing in cycles of 4 ft. This support system will be operated independently from supports on the face itself.

Powered supply equipment for the



Outdoor demonstration of the remotely controlled longwall face (ROLF) assembly



Showing the ROLF assembly in course of being advanced

coal face and loader gate machinery will be carried on a rail-mounted structure ("pantehcon") incorporating the inbye chain stage loader and will be operated from a control console at its outbye end. Two stage loaders are incorporated in the loader gate layout having an overlap of 50 yards; this allows the face to advance for one week before it becomes necessary to move the tail end of the gate conveyor. A pantehcon is also installed in the tail gate to carry the switchgear and power packs required to operate the tail gate equipment. Each face will work three production shifts and one maintenance shift each of six hours. The production shifts with a planned machine advance of four 24-in. strips per shift will give an advance of eight yards per day.

Transport and Preparation

The coal is carried from the face to the pit bottom by belt conveyors, being transferred from gate conveyor to subsidiary trunk and finally main trunk conveyors. The transfer points are unmanned and the whole of the system is controlled by one man in a

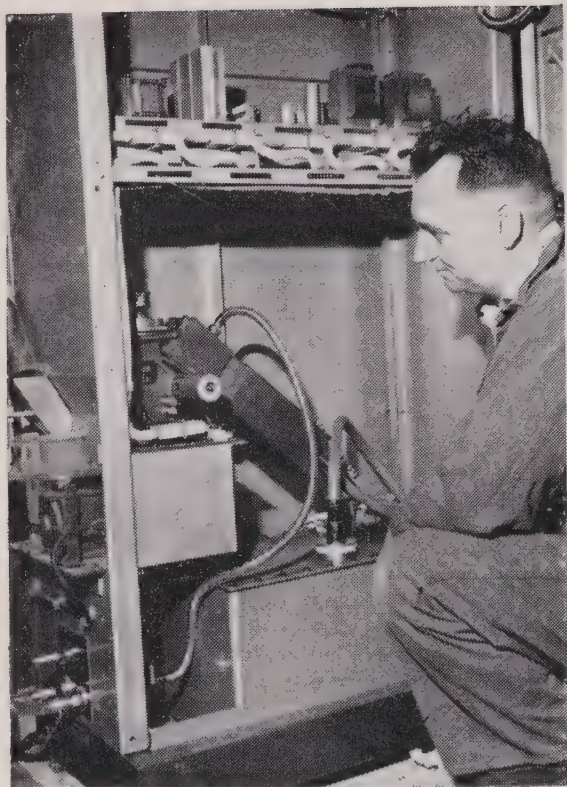
control room. What was particularly impressive was the control system, and the automatic transmission of information about any fault that might develop, including temperature protection devices on all vulnerable parts. Closed circuit television control is also incorporated.

To ensure a continuously even flow of coal to the surface the conveyors unload into a 1,000 ton bunker. From here—again with automatic controls—the coal is fed to a skip feed conveyor, hence to the skips, and up to a receiving hopper on the surface en route for the coal preparation plant, with remote control and observation throughout.

The preparation plant has a total capacity of 600 tons per hour of raw coal and is designed to produce a 1 in.-0 product having an ash content of 15 per cent and a moisture content of 12 per cent suitable for use at electricity generating stations.

The raw coal is crushed to 6 in. and the large dirt removed. It is then screened, washed, further crushed and treated in a series of operations that need not be detailed here, but which end with cleaned coal and unwashed smalls being blended so as to maintain a constant 15 per cent ash content. The ash content is continuously checked by sampling, the ash being determined automatically in a Cendrex apparatus.

Finally, the coal is delivered to outloading bunkers, of which there are four, each of 1,000 tons capacity. A railway train passes under them, and when it is correctly positioned, as indicated by the signals, coal is fed from the bunkers into the four weighing hoppers which are weighed automatically before being simultaneously discharged into four separate rail wagons, after which each hopper is reweighed. The net weight of coal discharged into wagons is automatically recorded on an advice note. The train is re-positioned by the engine driver and the procedure repeated until the whole train has been loaded.



CendreX ash analysis. A sample for X-ray test is delivered by the tube (left) from the coal conveyors each minute and an analysis is provided in four minutes

A great deal more fascinating information could be given about further aspects of the colliery and its operation, including such matters as methane monitoring, control and drainage, personnel communications throughout the pit and surface control rooms, and the transmission of production information through the central control, in digital form from an electric typewriter to a slave typewriter in the manager's information room. Mention must also be made of the elaborate information feed to the control centres and other sectors by visual eight-light indicators, showing the situation of the operating state of all plant within all sectors.

There is also the manpower deployment system to be noted. An indicator unit in central control shows the state of manpower deployment of surface and underground sectors. The signals are manually initiated from the facsimile board in the manpower deployment centre. This centre, in the administrative block, is designed round an electronic deployment

system, specific reporting positions being provided for each district or section of the mine. After completion of deployment of his sector the deploying officer notifies the position to the central control room.

The electronic deployment boards are then set up for scanning and the information reproduced in the form of a typewritten sheet and punched tape. The records thus produced are used as the basis for a time-keeping system, and from the punched tape the divisional computer centre will produce the weekly payroll without further direct labour.

Finally, we need only say that the colliery is clean and quite smokeless, and is not likely to do anything to harm the pleasant woods and farmlands that surround it. The power it requires is electricity from the grid—some of the energy it sends as coal to the C.E.G.B. returning for its own use—and the only solid fuel burned is in the boiler of the pit-head baths.

Pit-head baths are still not unnecessary, but the kind of progress in mining that is so well demonstrated at Bevercotes suggests that in time there will be little need for them. Mining is on the way to becoming a white-collar, white-overall, profession.

Women's Resolution

Among the resolutions accepted by ballot for the annual conference of the National Council of Women of Great Britain, at Portsmouth in October is the following:

The National Council of Great Britain in Conference assembled, being gravely concerned with the serious effects of air pollution on the health of the nation, urges H.M. Government to take the necessary measures to secure more effective control of the emission of dangerous and obnoxious fumes from motor vehicles.

This is a combination of resolutions submitted by the Tunbridge Wells, and Berkhamsted Branches and the Executive Committee of the Women's Liberal Federation.

THE NEW ALKALI WORKS REPORT

Emphasis on Co-operation

101st Annual Report on Alkali &c. Works by the Chief Inspectors, 1964. Presented to the Secretary of State for Wales, to the Minister of Housing and Local Government and to the Secretary of State for Scotland. pp. 76. H.M. Stationery Office. 5s. 6d. net.

THE report for England and Wales is the first over the name of the new Chief Inspector, F. E. Ireland, though much of the ground-work for it was prepared by his predecessor, Dr. J. S. Carter, to whom a generous tribute is made. Dr. E. A. Balfour Birse contributes the much shorter report for Scotland.

The arrangement of the two reports is little changed, and as usual a vast amount of technical information is packed into them, covering a wide range of industrial processes from nuclear power stations to arsenic works. Once again we must say how much, for specific reference purposes, an index to processes would be valued.

The report says that co-operation between industry and the Alkali Inspectorate in efforts to achieve clean air is envied by air pollution control officers of other countries. It goes on:

"It is only from the experience gained by participating in the organization of international affairs and noting the efforts of other countries to enact legislation and set up effective air pollution control departments that we appreciate the simple and effective methods adopted in this country. Co-operation of industry with the Inspectorate is unique and the envy of air pollution control offices from other countries who seek our advice. Our debt to industry is freely acknowledged. Were it not for their work, individually by works and collectively through research associations and the like, on our behalf, our task would be much more onerous than it is, the size of the Inspectorate would need multiplying several times and a department would be needed for specialized techniques of waste gas sampling

and analysis as well as for developing air pollution control measures. As it is, industry investigates, shares its results with us, assists in the evolution of 'best practicable means' and then the Inspectorate uses the information to negotiate standards with trade representatives. This is a happy relationship, born out of 101 years of mutual trust."

The report goes on to describe the way in which the changing face of industry is affecting the tasks and responsibilities of the Inspectorate. Stoke-on-Trent is instanced as a place where change is evident, and, states the report, so far as the inspectorate is concerned there is now no air pollution problem in the pottery industry.

"... The steady fall in the number of operable traditional, coal-fired, bottle ovens which by their very nature cannot even with the strictest adherence to the agreed codes of practice be fired smokelessly continues. The overwhelming bulk of pottery made is now produced by methods of smokeless firing. Before the 1939-45 war there were over 2,000 coal-fired, operable bottle ovens in the Stoke-on-Trent area. When the relevant Alkali order came into force in mid-1958 there were 295, falling to 222 at the end of 1959, to 157 at the end of 1960, to 95 at the end of 1961, to 70 at the end of 1962, to 30 at the end of 1963 and to 20 at the end of 1964. It will be clear from the foregoing that Stoke-on-Trent had begun to put its house in order long before the passing of the Clean Air Act in 1956. There can be few, if indeed any, cities with such a record of achievement in dealing with the smoke from the local industry. Smoke from pottery manufacture has virtually disappeared and all concerned, the pottery and fuel industries, the local authority and the research association can take proper pride in an achievement which at one time seemed impossible. The bottle oven will soon indeed become a museum piece for with commendable wisdom and an appropriate sense of what is fitting the local authority and the industry are to preserve a bottle oven as a permanent exhibit. It has been cleaned

and fitted with suitable electric lighting as a show place, for visitors.

"In view of what has occurred and as a reminder of what conditions at one time were it is apposite to quote from the report for 1878 of the Medical Officer of the Local Government Board, the precursor to this Ministry. In the pottery district of North Staffordshire chimneys may at any time be seen vomiting forth black smoke . . . filling the streets and roads to such an extent as sometimes to impede vision beyond a distance of a few yards. The wind of change has indeed blown."

As older technical processes fall into disuse, new ones are developing, and the broad responsibilities of the Inspectorate are increasing with production, and more than *pro rata*. Additionally certain relatively small areas are emerging as of special concern by reason of ever-increasing industrialization.

"Industrial Tees-side with its chemical and iron and steel industries has long presented a problem and the industrialization and increase in production is still proceeding with the added problem of a steadily developing petroleum refining industry. Another region giving rise to concern is the Thames Estuary. The cement dust problem is the most spectacular and as concerns the political and administrative side perhaps the most important. But it is not the most serious. The Thames Estuary petroleum refining industry, already considerable, is still expanding and a major build up of power stations is occurring to the East of London. North Lincolnshire from Scunthorpe (iron and steel) to Grimsby (chemicals) is now the more important part of the district based on Sheffield and will become more so as the new petroleum refining industry develops. The belt of giant, coal-fired power stations, each of 2,000 mW or more capacity, building and projected, stretching southwards from Selby down to Nottingham is going to be a really major responsibility. In due course the developing Severn-side project will become a major matter.

"Taken together these have already led to a searching and realistic reappraisal of the responsibilities and the day-to-day activities of the inspectorate."

A number of specific complaints investigated by the inspectorate in

1964 concerned 371 works compared with 323 in 1963, and as in earlier years the degree of justification varied. Complaints concerning registered works were most numerous against ceramic works (44), electricity works (40), iron and steel works (34) gas and coke works (30), aluminium works (19), cement works (17), sulphite works (11), and metal recovery works (10). The total number of visits and inspections carried out during the year was 11,556 compared with 10,850 for 1963.

The inspectorate has also dealt with an increasing number of enquiries from overseas, not only from public health authorities, but also from companies and plant operators.

Scotland

In his Annual Report for 1964 to the Secretary of State for Scotland the Chief Alkali Inspector for Scotland, Dr. E. A. B. Birse, indicates that the measures taken by firms to prevent discharges of noxious and offensive gases from registered premises were generally satisfactory.

At electricity generating stations some 5.1 million tons of coal were burned, and emphasis continued to be centred on the arrestment of grit and dust with a noticeable steady improvement.

Pig-iron production was 1.9 million tons and all the blast furnaces are designed and equipped in a way which reduces emissions to very small proportions. The final closure of one of the surviving examples of the older types of blast furnaces took place during the year.

In the gas industry he reports an increasing use of oil for making gas. At the end of the year three further oil gasification plants were in an advanced state of construction. Experience of the operation of these plants continues to be favourable so far as reduction in air pollution is concerned.

The throughput of crude petroleum and processed oils at 3.9 million
(concluded on page 40)

ELECTRICITY IN THE HIGHLANDS

North of Scotland Hydro-Electric Board, Report and Accounts 1 January, 1964 to 31 March, 1965. H.M.S.O. 7s. 6d. net.

The North of Scotland Hydro-Electric Board, established by the Hydro-Electric Development (Scotland) Act, of 1963 began its supplies of hydro-electricity in 1948 from two small power stations, Morar and Lochalsh, and has now completed the development of nearly half the water power resources of the North of Scotland, and has made electricity available to 93 per cent of the premises in the area. It has in commission 54 hydro-electric stations of a combined capacity of 1,047 MW, two steam stations of 125 MW and eight diesel stations of 47 MW.

Four hydro-electric schemes totalling 98 MW are under promotion,

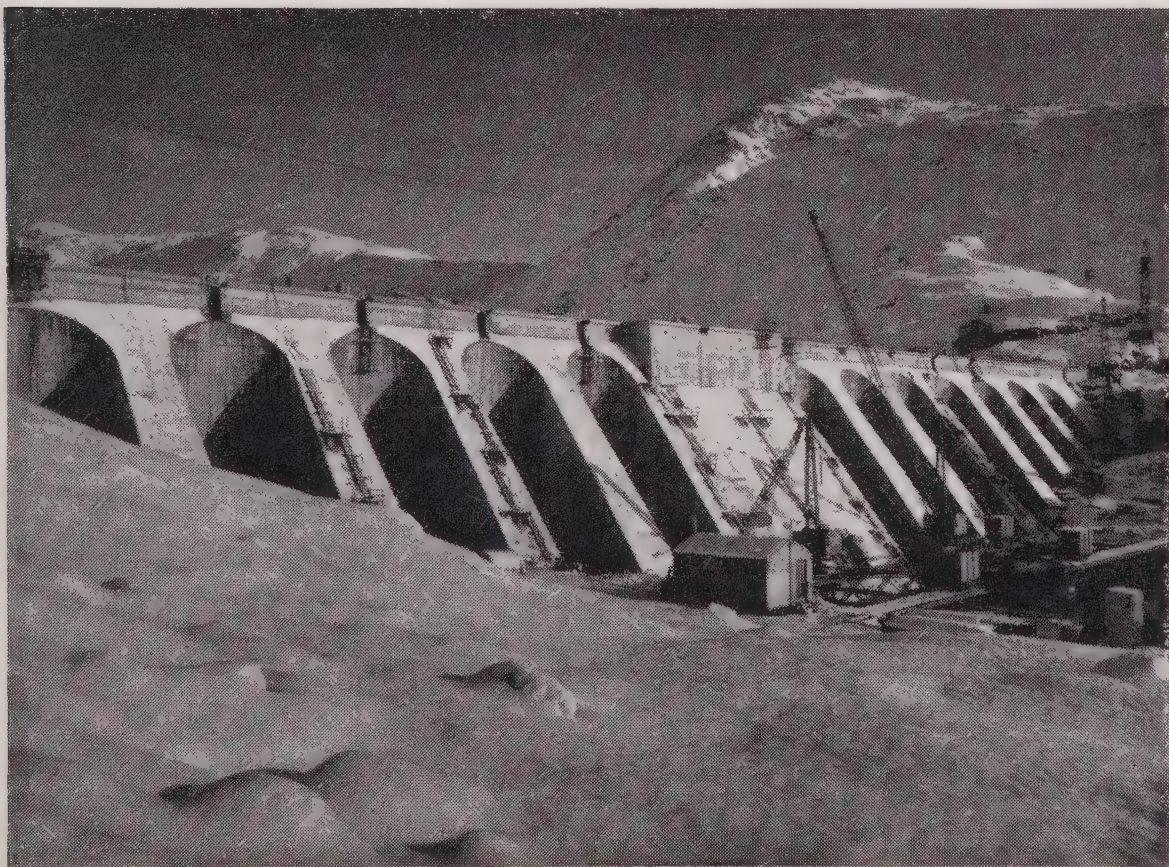
10 conventional schemes with a total capacity of 390 MW are under survey as is also the pumped storage scheme at Loch Sloy with a projected capacity of 1,200 MW.

Most of the activity on new construction has been on the 400 MW pumped storage scheme at Cruachan, which will accommodate four single-stage reversible pump turbines for a high head of 1,200 feet.

Two 120 MW oil-fired sets are being installed in the Carolina Port steam station at Dundee, and during the period under review, 2,890 kW diesel sets were commissioned at Lerwick, Kirkwall and Stornoway and a 275 kW diesel set at Tobermory.

The total output from all stations amounted to 3,141 million units an increase of 7.7 per cent.

The rainfall for the 12 months



The Cruachan Dam during construction

January to December 1964 was 89 per cent of the long term average. During the dry weather, January to April 1964, thermal generation was a maximum amounting to 302 million units. Imports from the South of Scotland Board in 1964 amounted to 419 million units and from the Atomic Energy Authority at Dounreay to 38 million units.

The cost per unit of electricity from various sources was hydro-electric 0·7781d., steam 1·4258d., diesel 1·6676d., purchase from South of Scotland Board ·6566d., and purchase from other sources ·4387d.

The sales of electricity to consumers in the Board's area amounted to 2,568 million units; 1,269 million units to domestic consumers, 182 million to farms and crofts, 530 million units to commercial undertakings. 545 to industrial consumers, 544 million units were sold of the South of Scotland Board.

As an indication of the Board's participation in the agricultural life of Scotland it is stated that there are 17,415 farms and 16,328 crofts already connected to the Board's system while 1,593 farms and 3,011 crofts yet remain to be connected.

There has been a demand for dual purpose driers for hay and grain and also for equipment for low temperature storage of cereals and root crops.

As a successor to the rail coach exhibition of catering equipment the Board has employed a 62-foot motor vessel "Western Isles" which has visited centres between Ullapool and Campbeltown.

Exhibitions have been held with a view to encourage industrialists to establish themselves in the North of Scotland area. The average price paid by consumers during the period from April 1964 to March 1965 was 1·731d. per unit.

Transmission

There are in operation 374 circuit miles of 275 kV overhead transmission lines, including the line from Windyhill, Glasgow to the Cruachan pumped

storage scheme where the connection from the overhead line to power station is by way of a 1,000 foot vertical shaft. Lightning was the cause of a large number of faults on the HV system and in March 1964 severe blizzards were the cause of 44 faults and four broken conductors.

Accounts have been prepared for fifteen months from 1 January, 1964 to 31 March, 1965. Subsequent accounts will be for the financial year ending 31 March.

The net surplus for fifteen months after providing for depreciation, interest, and financing expenses amounted to £595,084 and for the year to 31 March, 1965 to £198,948. The capital expenditure during fifteen months amounted to £21,254,962 net as follows, £14,318,388 by external borrowing and £6,936,574 from internal resources, a self-financing ratio of 32·6 per cent.

ALKALI REPORT—concluded

tons was the same as for 1963, and most of this tonnage was processed in the Grangemouth area. Dr. Birse comments favourably on the co-operation of the firms concerned on the problem of preventing air pollution, and on their readiness to consult with the Department's Alkali Inspectors.

The total number of visits and inspections carried out during the year was 622, of which 420 were to premises registered under the Act. During the year 48 chemical tests were carried out to check whether the provisions of the Act were being observed. Dr. Birse also refers to the experimental programme on dust emissions which continues to be carried out by the two-man team provided by the Department of Scientific and Industrial Research (now the Ministry of Technology). The team made 41 visits to various works throughout the year and 87 tests carried out.

NEWS FROM THE DIVISIONS

Formation of South West Divisional Council

At a meeting of members of the Society in the South West, held at Bristol on 7 July, it was agreed to set up a Divisional Council. This completes the regional organization of the Society throughout the whole of the United Kingdom, making a total of ten such Councils.

The south-west, except for the Bristol area, has not been strong in membership (for obvious reasons) and there has been a Bristol and West Clean Air Committee of local authorities. The Divisional Council will cover the whole region as defined in the Society's constitution—namely the counties of Cornwall, Devon, Dorset, Gloucester, Somerset and Wilts.

The meeting was presided over by the Society's Chairman, Mr. James Goodfellow, who spoke of the need for a clean air drive in the south-west. The Director, Mr. Marsh, explained how the divisional councils worked and their relationship to the national Society. There were questions and discussion and general approval with the proposal was followed by the unanimous adoption of a resolution to set up a Divisional Council. A provisional committee, to prepare and submit to another meeting a draft constitution, was elected, and Mr. R. V. Redston, Chief Public Health Inspector, Bath, was elected as Honorary Secretary.

Scottish Conference

The annual conference of the Scottish Division was held in Aberdeen on 20 and 21 May, with the annual business meeting taking place on the evening of the 19th. There was an excellent attendance of delegates at the opening session to hear a civic welcome from Lord Provost Norman Hogg. Councillor William Monteith, President of the Division, presided on this occasion. At others, Mr. John Foreman, Divisional Chairman, was in the chair.

Among the papers presented was one on smoke control area experience by Mr. James Goodfellow, chairman of the national Executive Council. He described the progress made in Leeds and the benefits that were accruing. The enemies of a proper public appreciation of the facts on smoke control were, he said, "ignorance, lethargy, superstition, and the desire to have no change".

Dr. Marjorie Clifton, of the Warren Spring Laboratory, gave a talk that was illustrated by slides. She stressed particularly the problem of carbon monoxide emissions from petrol

driven road vehicles, especially in narrow, canyon-like city streets, and referred to the concern that was now beginning to be expressed about the possible impairment of mental alertness among drivers. She said that the importance of other pollutants from motor vehicles was small compared with the pollution from other sources, particularly domestic smoke.

Mr. W. L. Baxter, of the Ministry of Transport, discussed the road pollution problem in another paper. He reminded the audience that there were now 600,000 diesel and 10 million petrol engined vehicles on the roads in Britain. By 1970, it was estimated, the number would be about 18 millions.

On the Friday morning there were papers on the domestic fuel supply situation by representatives of the fuel and power industries—Mr. L. B. Perkins, of the North of Scotland Hydro-Electric Board; Mr. W. J. Rawlings, of the Scottish Gas Board; Mr. J. B. Mitchell of Shell and BP., Scotland Ltd., and Mr. James W. Anderson, of the National Coal Board. Mr. Anderson took all the



Councillor W. Monteith, President of the Scottish Division, with James Goodfellow, Chairman of the national Executive Council, at the Aberdeen Conference. Councillor Monteith is wearing the new Scottish Presidential badge, purchased with the aid of a bequest from the late Mrs. W. Brownhill Smith

solid smokeless fuels under his wing. These contributions gave the conference much useful information and stimulated a good discussion. Towards the end, Mr. Marsh from headquarters, gave a brief progress report on the clean air situation generally.

Mr. John Innes, a former Divisional President and former Chairman of the national Executive, gave the conference some excellent press publicity by bluntly saying that Aberdeen wasn't as clean and as healthy as they thought it was. It has an air pollution problem but didn't realize it.

In another contribution to the discussion Mr. J. P. Weston, of the South of Scotland Electricity Board, said that a monitoring station on the north coast of Scotland was picking up air pollution from the industrial belt—the Forth-Clyde valley. With the wind in the right direction, he said, Aberdeen could well be getting

a share of that pollution.

Altogether it was a stimulating and constructive conference, with healthy undertones of a growing optimism.

East Midlands

In an address to the East Midlands division of the Society at Chesterfield on 14 July, Mr. A. E. Bloomfield, Regional Marketing Manager of the National Coal Board, spoke of the vast capital expenditure authorized by the Board and of the very considerable contribution this would make in the field of premium fuel.

Plants for the production of Home-fire, Roomheat and Phurnacine, under construction and in operation, would have an annual production of 1 million tons by 1966/67. The East Midlands, Scotland, Lancashire and Yorkshire were areas in which additional plants were projected, each taking about a year to build, Mr.

Bloomfield said that if the demand warranted it, annual production of solid smokeless fuels could be raised to $1\frac{3}{4}$ to 2 million tons by 1967/68. He spoke of the increase in fuel production from 6 million tons in 1960 to 8 million tons in 1964, in spite of a 28 per cent decrease in the number of premises covered by smoke control orders.

In suggesting that the clean air clock had been put back in 1964, the speaker felt that this was attributable to the Government's White Paper of 1963, which forecast a deficit of 400,000 tons of reactive open fire fuel in 1965. Delays in the smoke control programme had occurred but the revised estimate of January 1965, forecasting adequate supplies of these fuels, led Mr. Bloomfield to state confidently that the deficiencies "will not in fact occur".

There was a nationwide demand for central heating and modern efficient smokeless heating systems and the N.C.B. would endeavour to meet these demands. In order to do this a new technology was needed; one which would satisfy a number of conditions. These were: higher throughput at the plants, high yields of solid smokeless fuel, and fuels which would burn well and leave no bulky ash. Once the public had developed a taste for the premium fuels they would be prepared to pay the necessary higher prices, realizing that the cost of heating represented only a small fraction of their family budget.

Mr. Bloomfield's summing up of the fuel situation was encouraging. He stressed that substantial quantities of smokeless fuel would be available on the market and that production would rise to meet the public demand. There was therefore, no reason for local authorities to delay in implementing their smoke control programmes.

His Worship the Mayor of Chesterfield was present and was thanked by the Chairman, Councillor Mrs. D. M. Ashley for providing Town Hall facilities for the meeting.

Correspondence

THE PENALTY FOR CENTRAL HEATING

*The Editor,
Smokeless Air*

Sir,

I trust that at the Eastbourne Conference in October, 1965—at which I regret I shall not be present—someone will draw the attention of the Ministry of Housing to the fact that throughout the country central heating installations in domestic premises are penalized to the extent of an additional £10 on the assessment of the property, irrespective of the fuel used.

I think Mr. Mellish will agree with his colleague, the Minister of Power, that it is absurd to put our valuable raw coal on an open grate and send up the chimney about 75 per cent of its heat content with volumes of smoke. This pollutes the atmosphere, giving us bronchitis, destroying the vegetation, and fouling our buildings. Your statistics pinpoint the domestic fire as the worst offender.

Smokeless fuel for open grates is expensive and seems to be difficult to obtain in some areas, judging by the amount of raw coal used in some houses. Central heating using any of the four fuels available overcomes this objectionable use of raw coal which has been so vehemently condemned by Dr. P. J. Lawther in his lecture to the Royal Society of Arts in March 1965.

It would therefore seem more sensible, in this modern age, that instead of rating domestic central heating installations under the hypothetical ideas contained in rating acts about a hundred years out of date, a rebate on rates should be given to those householders who contribute to clean air by installing central heating in their homes.

Yours, etc.,

C. A. Kershaw,
M.A., B.Sc. (Eng) etc.

*Christchurch,
Hants.*

SMOKE CONTROL AREAS

Progress Report

POSITION TO 1 JULY, 1965—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,621	50
<i>Acres</i>	365,859	16,880
<i>Premises</i>	2,024,456	113,692
Smoke Control Orders		
Confirmed	193	18
Submitted	93	4
Grand Totals	1,951	73

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Summer, 1965) which gave the position up to 1 April, 1965. They now show the changes and additions to 1 July, 1965.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control Areas in Operation Northern

Tyneside and Wearside

*Gateshead C.B. No. 6, Newcastle upon Tyne C.B. No. 12.

Yorkshire

West Riding (North)

*Bradford C.B. No. 5, Halifax C.B. Nos. 8 to 10, Horsforth U.D. Nos. 14, 17, 18, 19, 21, Knottingly U.D. No. 5, Leeds C.B. Nos. 42 to 45, 47, 48, Rothwell (Yorks) U.D. No. 7, Sowerby Bridge U.D. No. 7.

West Riding (South)

Swindon U.D. No. 6.

North Western

South Lancashire and North-East Cheshire

Audenshaw U.D. No. 3, Chadderton U.D. No. 6, Cheadle and Gatley U.D. No. 6, Denton U.D. No. 7, Droylsden U.D. No. 9, Eccles B. No. 6, Oldham C.B. No. 6, Stalybridge B. Nos. 7 and 8, Stretford C.B. Nos. 5 and 6, Salford C.B. No. 10.

Central Lancashire

Blackburn C.B. No. 4, Burnley C.B. No. 5, *Preston C.B. No. 9.

Merseyside

Bootle C.B. No. 6, Wallasey C.B. No. 10, Widnes B. No. 4.

West Midlands

Birmingham C.B. Nos. 107 to 111, Brierley Hill U.D. Nos. 16 to 19, *Halesowen B. No. 22, Coventry C.B. No. 6, Sutton Coldfield B. No. 3.

Potteries

Kids Grove U.D. Nos. 8 and 9.

London

County of London

Battersea M.B. No. 4, Bermondsey M.B. No. 6, Bethnal Green M.B. No. 4, Chelsea M.B. No. 3, Westminster M.B. No. 16.

Outer London

Brentford and Chiswick D. No. 5, Bromley B. No. 6, Chislehurst and Sidcup U.D. No. 2, Croydon C.B. No. 6, Ealing B. No. 18, *Edmonton B. No. 6, Hayes and Harlington U.D. No. 23, Hendon B. Nos. 11 and 12, Southall B. No. 6, Tottenham B. No. 5, *Wimbledon B. No. 4.

Local Authorities outside the Black Areas

Chatham B. No. 7, Cheshunt U.D. No. 4, Grantham B. No. 8, High Wycombe B. No. 12, *Hornchurch U.D. 6, Oxford C.B. No. 4, Slough B. No. 7, Staines U.D. No. 5.

New Orders Confirmed but not yet in Operation**Northern***Tyneside and Wearside*

Gateshead C.B. No. 9, Newburn U.D. Nos. 4 and 5, Wallsend C.B. Nos. 3 and 4.

Teeside

*Hartlepool B. No. 1, Middlesbrough C.B. No. 4.

Yorkshire*West Riding (North)*

Dewsbury C.B. No. 6, Halifax C.B. No. 12, Huddersfield C.B. No. 10, Horsforth U.D. Nos. 8, 22, Leeds C.B. Nos. 49 and 50, Shipley U.D. No. 6, *Spenborough B. No. 6.

North Western*South Lancashire and North-East Cheshire*

Bredbury and Romily U.D. No. 3, Dukinfield B. No. 6, Failsworth U.D. No. 4, Heywood U.D. No. 6, Hyde B. No. 4, Manchester C.B. No. 14, Stretford B. No. 7, Stockport U.D. No. 6, Urmston U.D. No. 4, Whitefield U.D. No. 8.

Central Lancashire

Burnley C.B. No. 4, Church U.D. No. 4, Preston C.B. Nos. 11 and 12, *Preston C.B. No. 10.

Merseyside

Bebington B. No. 9, Huyton-with-Roby U.D. No. 4, Warrington C.B. No. 7.

Midlands*Derby, Nottingham and Chesterfield*

Dronfield U.D. No. 1, Ilkeston B. No. 1.

North Midlands

Leicester C.B. Nos. 14 and 15.

West Midlands

Birmingham C.B. Nos. 112 to 114, Brierley Hill U.D. Nos. 20 to 25, Solihull

C.B. Nos. 5 to 7, Stourbridge B. Nos. 21 and 22, Sutton Coldfield B. No. 4, *Walsall C.B. No. 26, *Wednesfield U.D. No. 6, Wolverhampton C.B. No. 9.

Potteries

Kidsgrove U.D. No. 10.

London*County of London*

Deptford M.B. No. 7, Hampstead M.B. No. 7, Lambeth M.B. Nos. 14 and 15, Stepney M.B. Nos. 5 and 6.

Outer London

Crayford U.D. No. 3, Enfield B. No. 5, Finchley B. No. 11, Harrow B. No. 9, Hornsey B. No. 7, Sutton and Cheam B. No. 3, Willesden B. No. 7.

Local Authorities outside the Black Areas

City of Rochester B. No. 2, Grantham B. Nos. 9 to 11, Watford B. No. 4, Yiewsley and West Drayton U.D. No. 8.

New Orders Submitted for Confirmation but not yet Confirmed**Northern***Tyneside and Wearside*

Whickham U.D. No. 4.

Teeside

Darlington R.D. No. 1.

Yorkshire*West Riding (North)*

Aireborough U.D. No. 18, Batley B. No. 4, Horbury U.D. No. 3, Keighley B. No. 6, Leeds C.B. No. 51, Morley B. Nos. 30 and 31, Queensbury and Shelf U.D. No. 4, Stanley U.D. Nos. 2 and 3.

West Riding (South)

Swinton U.D. No. 9.

North Western*South Lancashire and North-East Cheshire*

Ashton-under-Lyne B. No. 6, Chaderton U.D. No. 7, Cheadle and Gatley U.D. No. 7, Oldham C.B. No. 7, Manchester C.B. Nos. 9, 15, Salford C.B. Nos. 8, 11, Stalybridge B. No. 9, Worsley U.D. No. 3.

Merseyside

Wallasey C.B. No. 11, Widnes B. No. 5.

Midlands*Derby, Nottingham and Chesterfield*

Arnold U.D. No. 1.

West Midlands

Aldridge U.D. Nos. 20 and 21, Dudley C.B. No. 8, Halesowen B. Nos. 24, 26, Smethwick C.B. No. 7.

Potteries

Newcastle-under-Lyme B. No. 5.

London

County of London

Hammersmith B. No. 1.

Outer London

Barking B. Nos. 9 to 11, Ealing B. No. 22.

Local Authorities outside the Black Areas

Exeter C.B. No. 10, Letchworth U.D. No. 2, Todmorden B. No. 4.

SCOTLAND

New Smoke Control Orders Confirmed but not yet in Operation

Coatbridge (Kirkwood), Coatbridge (Drumpelleir and Blairhill), Grange-mouth (Bowhouse), *Lanark County (part of the Burnside).

New Smoke Control Orders Submitted but not yet Confirmed

County of Stirling (Larbert No. 1), West Lothian (Livingstone etc.).

Summary of Smoke Control Progress
As at 30 June, 1965

(1) Region	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern	16,360	13·1	74,605	13·5
East and West Ridings	88,020	23·4	316,250	27·1
North Midlands ..	18,830	7·0	72,345	14·1
Greater London ..	135,310	41·4	1,244,105	47·1
North Western† ..	90,840	22·6	402,495	23·6
Midlands	39,925	16·0	186,130	17·7
South Western ..	5,050	19·2	18,105	12·2
Wales and Monmouthshire	45	0·01	755	0·2
Totals	394,380	18·7	2,314,790	28·2

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (e.g. there may be some areas of open country).

† Radcliffe No. 4 withdrawn.

Corrections

In the caption to the photograph on page 302 of our Summer 1965 issue, showing a meeting of the Publicity Committee of the North West Division, the name of the Chairman of the Divisional Council, Mr. A. Taylor, of the National Coal Board (at the head of the table) was omitted from the list of names. Also, "North Wales Gas Board" should of course read "North Western Gas Board".

Mr. C. T. Melling is of course Deputy Chairman of the Electricity Council, and not C.E.G.B. as was stated on page 289.

The photograph on page 279, from the report on air pollution in Paris, should have been acknowledged to *Photo Izis, taken from Paris des Reves, Editions Clairefontaine et la Guilde du Livre, Lausanne*; and that on page 280 to *Claude Anger, Paris*.

Electrical Power Convention

Gives Platform for Gas, Oil and Solid Fuel

THE British Electrical Power Convention at Brighton in June provided a platform for leaders of all the principal fuel and power industries to speak on the future. For electricity there was Sir Ronald Edwards, Chairman of the Electricity Council and President of the Convention; for gas, Sir Henry Jones, Chairman of the Gas Council; for oil, Mr. John Davies (then) Vice-Chairman of Shell-Mex and BP Ltd.; and for solid fuel, Lord Robens, Chairman of the National Coal Board.

The pattern was similar to that at the N.S.C.A. conference at Harrogate last year, and no doubt it was hoped that it would promote some synthesis of purpose and harmony of action from these intensely competitive industries. Whether progress towards these laudable objectives was made may be judged from the excerpts from the papers we give below. And whether, if there was such progress, it is being maintained, may be judged from the news items we report elsewhere on the continuation of the war between gas and electricity over connection charges, proposals from electricity interests that gas should be taxed by taxing its feedstocks, and from gas interests that uranium for nuclear power stations should be taxed.

SIR RONALD EDWARDS

In his presidential address Sir Ronald first emphasized the importance of planning based on the demand forecasts of electric power. These, he said, would involve an immense investment of the order of £3,500 millions between April 1965 and March 1970. He went on to review the nation's growth target set

by the National Economic Development Council, describing it as ambitious but, given the will, attainable and to be considered alongside the Government's assumption of 25 per cent growth between 1964 and 1970.

Discussing the financial objectives of the nationalized industries, Sir Ronald said that "a pound newly invested or reinvested in gas should earn the same as a pound newly invested or reinvested in electricity. This would bring rationality into the economic tests applied to these competing nationally-owned industries". At present electricity has undertaken to try and earn a higher rate than gas. "... since the risks are not dissimilar, the minimum rate to be earned on capital expenditure should be the same".

Sir Ronald also suggested a reconsideration of the formula whereby the electricity industry had to earn depreciation, interest and "balance of revenue", on assets only partially constructed or constructed but not in commission. He told the Convention that in April this year the Central Electricity Generating Board's investment in capital works in progress was £775 millions. To meet the required return on these uncompleted works the industry had to earn gross some £65 millions a year—or seven per cent of the probable sales of electricity.

On the choice of fuels for power stations, Sir Ronald said: "As large a consumer as the C.E.G.B. is bound to consider the interim problems of its main supplier, and is wise to help the supplier to move with all speed towards efficiency and lower cost. It is right to give help to this end. But help beyond this, however strongly desired and however much our sympathy may be engaged, is not ours

to give. We have no authority to burden our consumers with the consequences". He warned: "If, however, over-riding national considerations demand a bigger preference to coal, the price of electricity will, of course, be higher than it would otherwise be, unless some counter-vailing relief is given. I have sometimes seen it argued that it does not matter whether this additional cost falls on the taxpayer direct or the electricity consumer who, so it is argued, is the same person. This is not true. It does matter. . . I would very much hope that the future arrangements between the coal industry and the Government may be such that any special help would come from the latter and not be sought from the fuel buyers".

The case for special support for coal was sometimes linked with the balance of payments argument that coal is an indigenous fuel. But there was an aspect of the balance of payments situation which he found difficult to understand. "The gas industry will, as soon as it can, turn its back on coal and rebuild its future on oil and natural gas. . . however complex the foreign exchange position may be, distillate oil for gas cannot be easier to provide than residual oil for electricity. The gas industry, however, pays no duty on its fuel, while the electricity supply industry pays tax on its heavy oil consumption (£10.5 millions in 1964/65) which has to be met by electricity consumers . . . on the one hand everything is being done to sustain coal consumption *inter alia* through the electricity supply industry, but at the same time the growth of that industry (and hence coal consumption) is demonstrably being curbed through the vigorous growth of a competing industry which increasingly relies on untaxed imported fuels. No doubt this anomaly will be considered in the discussions on future fuel policy".

On the future prospects for price and security in electricity supply, Sir Ronald referred to the growing burden of capital charges on work in

progress to make good plant shortages caused by consumer demand outstripping the growth of capacity and described exciting technological developments ahead which would include 47 new 500 megawatt generating stations to be followed by prototype 660 megawatt supercritical sets which would yield substantial economies.

JOHN DAVIES

The first paper at the Convention was delivered by Mr. John Davies, M.B.E., Vice-Chairman of Shell-Mex and B.P. Limited.* Mr. Davies assumed the mantle of a prophet and predicted that the householder of 1990 would require a universal fuel capable of operating all household gadgets and that to a large degree housing would be climate-conditioned, the rooms being maintained at a proper temperature and humidity differential from outside. At the same time, the air would be cleaned and gently moved, the lighting continuously graduated. In townships the fuel would be electricity. In low concentrated suburban areas, gas, in rural areas, liquid fuel. In those rural and suburban areas, fuel-cell developments would allow house-by-house electricity generation for lighting and perhaps other uses. Pipelines would multiply for the carriage of liquid and pulverized commodities of all kinds, but pipelines carrying different kinds of products seemed unlikely. An essential would be the planning of pipeline tracks to provide permanently accessible trenches for the laying of lines to move materials from ports to industrial zones, and between industrial zones.

There was a chance that the fuel cell would provide the main motive power for all road transport because of its efficiency, its noiselessness, its absence of exhaust and its tolerance of unsophisticated fuels. All these predic-

*Now to be the first Director-General of the new Confederation of British Industries.

tions assumed that generation would be localized and not consolidated in the national grid. With the very great changes implied, it was likely that liquid fuels and probably even natural gas fuels were unlikely to make much headway beyond the early '70s, after which time additional demand would be more and more met by nuclear generation, the situation in regard to coal and hydro-generation being also preserved more or less without change. These and other forecasts, when assembled produced a most interesting table of annual liquid fuel consumptions in million tons:

	1964	1994
Road vehicles ..	13	30
Heating	6	3
Railways	1	1
Ships (not international)	1	2
Aircraft	2	6
Industrial Plant ..	19	65
Gas Making	3	35
Electricity generation ..	6	10
Chemical products ..	3	30
Roads	1	4
Lubrication	1	2
Refinery fuel	4	10
Sundries	1	2
	<hr/> 61	<hr/> 200

Mr. Davies concluded by saying that he had deliberately refrained from any reference to political risks or discreetly worded finger-crossing on the subject of atomic warfare. He believed that he would live to see the generation which first, in all mankind's chequered and turbulent history had no more to reckon with war.

SIR HENRY JONES

Sir Henry Jones, K.B.E., spoke next, his paper being devoted to "The Future of Gas". He referred to the sharp competition between gas and electricity in domestic cooking, space and water heating. Britain alone, apart from those with hydro-power, was a country where electricity competed directly with gas for permanent space heating.

Commenting on the comparative efficiency of gas and electricity production, Sir Henry said an engineer might still "question a system which involves the loss at the power station in flue gases and cooling water of two-thirds of the heat in the fuel. The gas industry uses production processes in which roughly a tenth of the heat in the feedstock is used. Up to 92 per cent of the heat value in the raw material is available in the gas produced." He went on to review the present progress and prospects of gas describing the new methods of gas manufacture and the new sources of gas supply which had transformed the industry's competitive position. The attractions of gas to the consumer were then described as a combination of a flame, a housewife and a gas tap providing quick and precise control mechanism, whereby the housewife observes the size of the flame at the burner, and sets the tap to give whatever rate of heat release experience tells her is needed. She can alter it instantaneously whenever she wishes. "With no storage, a visible flame, very high rates of heat release, ease of ignition, relatively simple safeguards against flame failure, and efficient automatic control when required, gas should be popular, as indeed it is", Sir Henry said. He described the competitive position in the domestic market as complicated. Gas had struggled over the years against certain elements who convinced themselves that everything gas could do, electricity could do better. In the early 1930's, the Gas Undertakings Act of 1934 made it illegal for local authorities in connection with premises which they owned, or in which they had an interest, to restrict the right of any owner or occupier of the premises to take a supply of gas. Even today, efforts have been made to exclude gas from domestic properties by using the monopoly position which the electricity industry holds for lighting and television to prevent competition from the only effective competitor, gas, for the cooking, water heating and space heating loads.

Turning to the gas heating boom, Sir Henry said sales of gas space heating equipment in the last three or four years had probably relieved the electricity mains of some 9,000 megawatts of load at peak times. The gas industry, with the low capital cost of new oil reforming plants which could be installed in twelve months (equivalent to less than £8 per kilowatt as against more than £30 per kilowatt for power stations) felt no anxiety in accepting this load.

LORD ROBENS

The final paper of the Convention, titled "The Future of Coal", was presented by Lord Robens, Chairman of the National Coal Board. Lord Robens said he was putting forward a longer view of coal, one that was often lost sight of in the events of the day. In looking ahead, it was too easy to be persuaded that what was happening today was more significant than it really was and took as an example, a new thermal power station to be laid down in 1965.

"Say that it will take five years to build", said Lord Robens, "and will begin to generate electricity in the middle of 1970, and that we are required to decide what fuel is to be used to heat the boilers. The station may have a working life of thirty years after commissioning, but of those thirty years only the first fifteen, perhaps, will be on base load. It is during the years on base load that fuel requirements will be at their greatest, that is between 1970 and 1985. And it is the price relativity between the alternative sources of heat during those years which should be the criterion for deciding on choice of fuel. Price relativity at this moment of time is quite irrelevant."

A lot of work had been done to estimate energy requirements. He wanted to take a fresh look. Forecasting was improving foresight. In the last 40 years energy consumption throughout the world had doubled; all indications pointed towards a much faster rate of growth during the next

40 years when the world might be using an extra 15,000 million tons of coal equivalent a year.

Lord Robens welcomed the adoption of the Advanced Gas-cooled Reactor for the second generation of nuclear stations as it would have a negligible effect on the balance of payments. The cost of producing a unit of electricity at an A.G.R. station was estimated to be 0.49d. compared with 0.54d. at a new coal-fired power station. But it would take at least five years to get A.G.R. under way, and these were estimated figures only. The costs at coal fired power stations were certain, not estimated, and the coal industry had five years to get them down by a mere 0.05d. a ton. In making comparisons it would be foolish to assume that coal firing would remain static.

There was still a measure of uncertainty about nuclear power and it looked as though the bulk of the world's energy supplies would continue to be provided by coal, oil and natural gas. The oil industry had made great strides but the growing sums needed for capital investment were going to be more difficult for oil companies to find. No one would deny that oil would continue to have a growing share of the energy market, but it would be unwise to expect the recent rate of growth to be maintained indefinitely.

Lord Robens advocated the conservation of indigenous fuels in Western Europe. The addition of natural gas in Holland and under the North Sea must be welcomed. The deposits discovered, though spectacular, were still small compared to total needs. Geologists had estimated that coal represented 66 per cent of total reserves of fossil fuels—too large a proportion to be neglected. Both the United States and U.S.S.R., who had ample reserves of oil and natural gas, were planning substantial increases in coal production, and France, West Germany, Holland, Spain and Portugal were planning new coal-fired power stations. The conclusions to be drawn

from European experience, where coal's future was accepted, was one of priorities. As a first step power stations should be fired by coal and, where possible, situated in the coal-fields.

"I firmly believe", said Lord Robens, "that the technological revolution which has now begun in the coal industry offers a real prospect of a breakthrough to a new low level of production costs which will have a profound effect on the relativity between coal and oil prices in this country. Let me try to explain the basis for this claim. In 1951 the average cost of producing a ton of coal was 49s. 2d.; by 1961 the figure had risen to 88s. 5d. Anyone using extrapolation techniques in 1960 would have forecast that by 1965 production costs—and prices—would have risen by 40 per cent. In fact this had not happened. Costs of producing a ton of coal in 1964-5 were just the same as in 1961 despite the very heavy rise in costs, enabling the Board to avoid a general increase in the pithead price of coal for nearly five years. Lord Robens went on to explain that costs had been stabilized—through increasing productivity. The mainspring had been mechanization, and the industry was now thinking in terms of the fully automated mine. There was great potential for increasing productivity in the industry. Another source of potential profit was in the elimination of uneconomic capacity, whereas in 1964 about 33 million tons were produced at a loss of more than 10s. a ton; another 33 million tons at up to 10s. a ton; the remaining 117 million tons were profitable. With new aids to productivity the potential output of profitable collieries could be as high as 185 million tons. There was room to close uneconomic pits which could not be made profitable without impairing the capacity of the industry. The task of rationalizing the industry should be completed by 1970. And it was not until 1970 that a power station begun now would be commissioned. And in the years following—when the station would require its

fuel—it was very unlikely that the relative costs of the fossil fuels would follow the pattern of today.

Lord Robens concluded by describing the potential of coal based on a completely new approach to mining techniques, the elimination of uneconomic capacity and increased output from the profitable pits. To realize this potential would take time, to sacrifice it now would be indescribable folly. Those who occupied the "commanding heights" of power would need to be far sighted in discharging their responsibilities or the day would come when they may be accused of failing the nation.

THE CITRINE LECTURE

Another important Convention occasion was when Lord Hinton of Bankside, K.B.E., F.R.S., former Chairman of the Central Electricity Generating Board, delivered the Citrine Lecture on "The Future of Power Technology". He stressed the dependence of future trends in the energy industries on a combination of economic social and commercial considerations. The role of increasing sales by both electricity and oil industries would lessen before 1975 as a result of competition, said Lord Hinton. The competitive power of the electrical industry depended largely on its ability to avoid unacceptable damage to visual amenity without incurring greatly increased costs, but he emphasized that the construction of the planned 400 kV network by 1970 with only limited undergrounding was absolutely essential. Thereafter, only comparatively modest extensions would be needed, but to these, as to the present construction work, the public would object. However, the ratio of underground to overhead cost was far less for low-voltage than for high-voltage lines; the extra cost of undergrounding one mile of 400 kV double circuit line would pay the extra cost of undergrounding 250 miles of 11 kV single-circuit distribution lines, and in his view this would make a greater contribution to the

preservation of visual amenity. Today 40 per cent of the C.E.G.B. capital expenditure on line work was on undergrounding and this was planned to rise to about 70 per cent in 1969/70. Discussing the direction of research, Lord Hinton stressed the importance of direct current transmission. Although only limited extensions to the 400 kV network may be necessary after 1970, as loading on the system became progressively heavier and problems of stability and control arose, it might be better on economic grounds to retain the single system but with d.c. links between areas to maintain stability. This justified energetic research into d.c. transmission, additional justification being that d.c. transmission would considerably reduce the cost of undergrounding as well as having advantages for overhead transmission.

Lord Hinton said that in some respects his uncertainties about nuclear power were greater now than ever before, but it was certainly emerging from its expensive adolescence and should be able to compete commercially with conventional power in favourable conditions before 1975. From then on its competitive power would continue to improve and its share of new generating capacity increase. By 1980 the capital needs of the supply industry would be about £1,000 million, so any additional expenditure on unessential nuclear plants was likely to be viewed with disfavour. The vast capital requirements of the electricity supply industry were its greatest enemy in the competition it faced and no high capital cost reactor system could expect an unrestricted future even though unit costs might be attractive. Although it was possible to forecast an increasing rate of construction of nuclear power plants, Lord Hinton said that it was not possible to label one single type of reactor as the most economical in all circumstances or to forecast the development potential of the competing types.

Summing up, Lord Hinton predicted that competition between the electricity

industry (supporting coal) and the oil industry would be bitter and the electrical industry would win only if it kept capital and operating costs down. The C.E.G.B. had about £750 millions locked up in capital work in progress which had to earn a return of 12 per cent though the works on which it was being spent earned nothing.

Electricity in the Home

In another Convention paper, E. G. Pluncknett, Managing Director of the Electrical Division of Tube Investments Limited, and S. F. Steward, Director of the British Electrical and Allied Manufacturers Association, presented a paper titled "Electricity's Future in the Home: The Complete and Competitive Service", in which they predicted that the goal of cheap and abundant supplies of electricity for British homes was likely to be achieved much sooner than most people have thought possible and described recent achievements in the production of electricity as of more immediate significance to the ordinary householder than spectacular efforts to reach the moon, or for that matter the speculative search for gas in the North Sea. Britain's balance of payments situation demanded the widest possible use of indigenous fuels.

Breathe it with Flowers

If you can't get rid of air pollution, at least make it smell nice, says Mr. Lucas Miel, general manager of Detroit's municipal bus service.

His department is planning an experiment with an odour-control chemical which makes bus exhaust fumes smell like flowers.

He said the Santa Monica, California, buses use the chemical and authorities there are pleased with the fragrant change.

"This process won't eliminate air-pollution caused by buses," Mr. Miel stated, "but we're working on that, too."
—*Press report from Detroit.*

Gas from Nigeria?

The Gas Council is closely studying a scheme for importing liquefied natural gas from Nigeria. It would meet about a fifth of Britain's total gas needs, and the price would be around 5½d. a therm delivered to gas boards.

At this level the cost would be much cheaper than any other major supplies so far available to the industry. The cost of making gas from conventional coal plants is between 1s. and 1s 3d. a therm.

Even the liquefied gas coming from Algeria, which not long ago was hailed as a spectacular breakthrough, costs the boards 7½d. a therm.

Supplies of Algerian gas, equivalent to 350 million therms a year,

account for 10 per cent. of British domestic consumption.

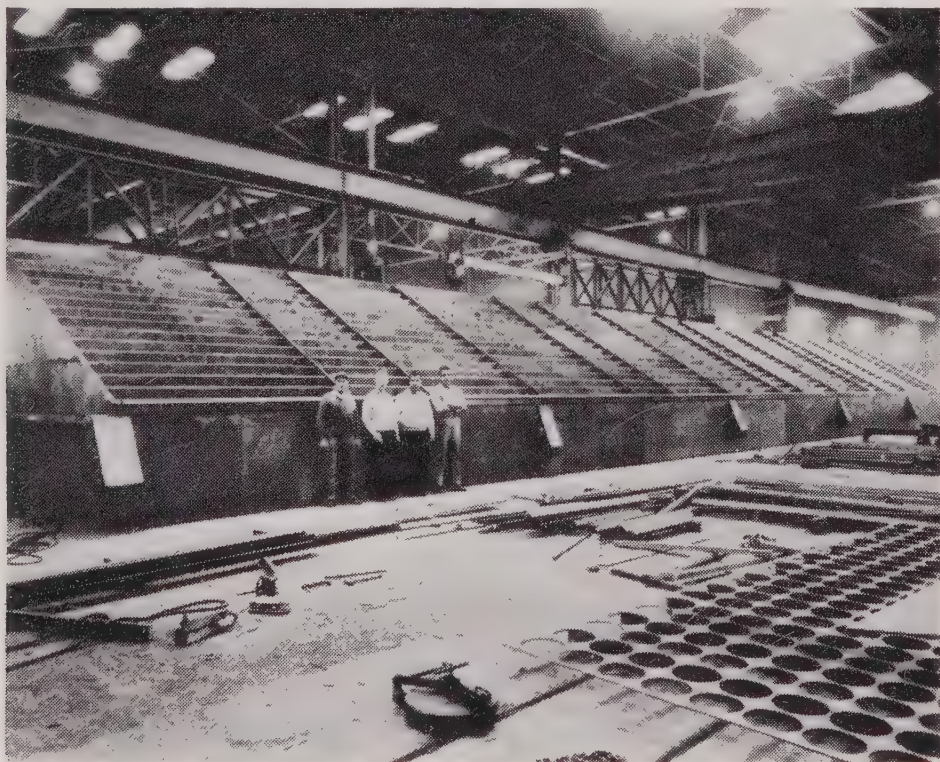
Now the Council has been offered up to 700 million therms a year from Nigeria. The large field there is being developed by Shell and BP.—*Daily Telegraph report.*

Air Pollution Attacks Venice

Concern for St. Mark's Basilica in Venice is mounting every year. Studies have revealed that the lower parts of the outer walls have absorbed water for 35 per cent of their volume.

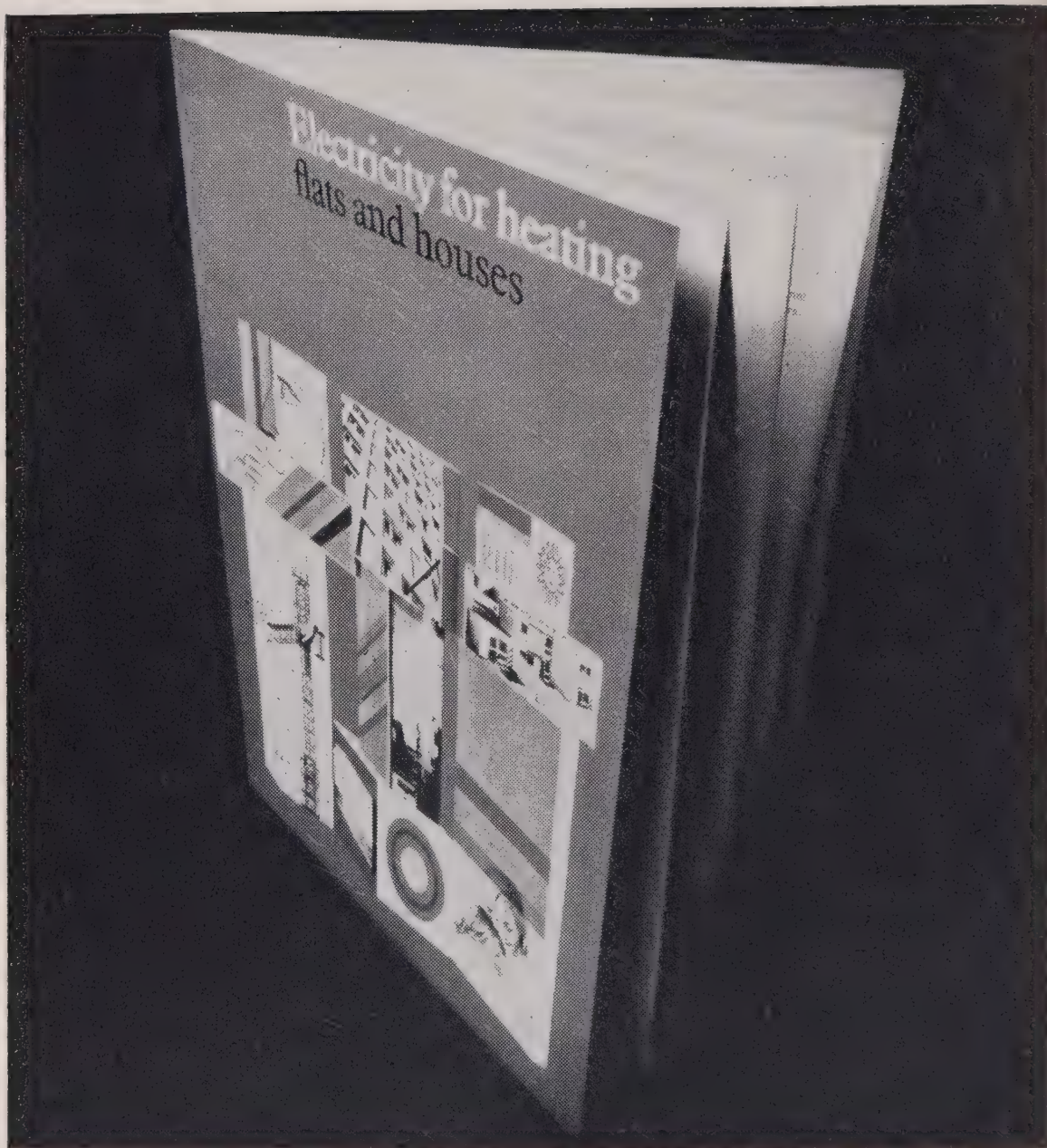
Another evil is chemical substances in the air from industrial plants in Marghera. The use in the past of silicones to coat the marble is now strongly criticized on the ground that it deprives the inner dampness of any outlet and creates harmful pressures.

Times Report



World's biggest Mechanical dust collector

That is the claim made for this Multiclone Dust Collector built by Western Precipitation Division of Joy Manufacturing company for the Illinios Power Company's station at Wood River. It is designed to handle 1,300,000 c.f.m. of effluent gases at 290°F. This Multiclone packs 2,100 tubes into its 125 ft. length and weighs about 450,000 lb. The multiclone dust collector is fabricated from heavy steel plate for the housing and hoppers. The collecting tubes and vanes which are subject to the erosion effects of fly ash, are fabricated from abrasion resistant cast iron, ¼ in. thick. The photograph was taken during trial fit-up in the Western Precipitation works and shows the Multiclone without hoppers. Every component was "match-marked" for exact fit when site erection was carried out. Further details from: Western Precipitation Division of Joy Trading Corporation, 7 Harley Street, London. Tel: Langham 7711.



Electricity for heating flats and houses

JUST PUBLISHED—the book gives a full description of the unique advantages of off-peak, low capital cost electric heating. Three such systems are described, each a major breakthrough in home heating. First—Floor Warming. Then—Unit-plan.

And now ELECTRICAIRES (warm air throughout the house at very low capital cost).

The book has been sent to architects, local authorities, consulting engineers, heating and ventilating engineers, surveyors, electrical contractors, builders and others. If you have not yet received a copy, or would like additional copies (free), please contact your Electricity Board. Or write direct to the Electrical Development Association (M/SA/3), Trafalgar Buildings, 1 Charing Cross, London, S.W.1.

The tomorrow things are electric

ELECTRICITY VERSUS GAS

We make no comment, but consider that the following should be quoted as the matters raised cannot but concern and affect clean air progress. A special report in the *Guardian* of 28 July read, in part, as follows:

The Government has been asked to impose a 10 per cent import duty on methane gas in order to protect the Central Electricity Generating Board from the inroads into the domestic heating market now being made by the expanding gas industry.

Sir Ronald Edwards, chairman of the Electricity Council, who is believed to be the author of this suggestion, refused yesterday to confirm or deny it. Nor would he comment on the counter-proposal (attributed to the Gas Council) for a corresponding import duty on uranium imported from Canada for use in nuclear power stations.

Other sources, however, confirmed that both proposals have been put before the Minister of Power, Mr. Lee, who presided yesterday over what may be the last meeting of his Energy Advisory Council before the Government publishes its national economic plan in the autumn.

Accusation

A 10 per cent duty on methane (which the Gas Council imports from Algeria) combined with an earlier proposal to tax the distillate oil used to make gas, would add 1d. to the price of a therm.

It is not known whether the Ministry which umpires the contest between gas and electricity, has taken either suggestion seriously.

Sir Ronald has now turned down a ministerial proposal that the two industries should call off their seven years' war about connection charges, a war which has led the Gas Council to accuse electricity boards of offering, in effect, rebates to property developers who exclude gas from new houses by varying the charge for connection to the mains.

BISRA OPEN DAYS

During two days in June, the doors of the British Iron and Steel Research Association's Battersea laboratories were opened to visitors who were free to wander among more than seventy

displays of development and investigation jobs carried out by the Association. The display showing the mechanism of atmospheric corrosion was of particular interest. This presented the current research into the mechanism of the corrosion of mild steel, together with the interim results of a new field investigation into the relationship between atmospheric pollution and corrosion rates for two steels.

Swedish Delegation

The Society was recently consulted by an important Swedish Government Committee, headed by Mr. Justice of Appeal Ulverson, which was visiting this country to acquire information on British experience in air pollution. A discussion was arranged at the Society's offices, and as the delegation were anxious to hear about the health aspects of the problem, Dr. P. J. Lawther, Director of the Air Pollution Unit of the Medical Research Council, was invited to participate.

Lung Cancer in Animals

In an article on French Cancer Research in *The Times* (23 July) the author wrote: "Nor is much heard in France of the possible relation of smoking to lung cancer, though the effects of both tobacco and alcohol are being closely examined. In this respect, experts in Toulouse have studied the rising incidence of lung cancer during the past 10 years among dogs and cats, in which the disease was previously practically unknown. They tend to find the cause is a viral agency stimulated by air pollution in industrial towns".

BS for PF Ash

Requirements for raw pulverized-fuel ash, used as a component material of normal Portland (ordinary and rapid hardening) cement concrete are specified in a new British Standard publication, B.S. 3892. Copies are available from the B.S.I. Sales Branch, 2 Park Street, London W. 1., at 5s. net.

MEDICAL ASPECTS OF AIR POLLUTION

Excerpts from a Paper to the East Midlands Division, N.S.C.A.

by D. Davies, M.D., M.R.C.P.

In the course of his address to the meeting of the Division at Cresswell, which was reported in our last issue, Dr. Davies said:

Chronic bronchitis is commoner in Britain than in any other country in the world. But we lead, not by a short head, but by lengths. Out of every 100,000 men in England and Wales, nearly 100 die every year from bronchitis. In Scotland 60 die every year and in Belgium 24. But when we get countries like Canada instead of 100 deaths we have eight. In Denmark they have about six and in Norway, four. So we have about 20 times the death rate from bronchitis in this country as they have in Scandinavia. We lose about 30,000 people from bronchitis every year in England and Wales—more than we do from cancer of the lung, about five times the number killed on the roads and 12 times the number dying from tuberculosis. Not only this, but the misery and ill health that comes before death is often pitiful.

Now why is Britain in this unique position? All the evidence points to its being the dirty air we breathe day in and day out for most of our lives.

We know that people who live in a town have twice the risk of dying from bronchitis as those living in the country. The more industrialized the town, the closer packed the houses and the greater the smoke, the greater the risk. If you take the death rate per 100,000 men in the age group 45-64 in various towns, they go something like this: Warrington in Lancashire, 320; Salford near Manchester, 320; and Oldham, 300. Then at the other end of the scale you have Yarmouth on the east coast with 67, Eastbourne, 63, and Hastings, 51. So you are five or six

times more likely to be killed by bronchitis if you live in an industrial town than if you live in a residential town. This difference between one town and another has very little to do with cold, damp and wet weather. In these respects rural Northern Ireland and the North of Scotland are worse off than other parts of the country but they have low bronchitis death rates because they have little smoke. Norway is much colder than England but only has a fraction of bronchitis deaths.

There are other figures worth mentioning. One is that three or four men die from bronchitis for every woman. This is one of the reasons for the excess of widows over widowers. Another fact is that the lower the social status of a person living in a town, the greater the risk of death. Probably the main reason for this is that poorer people live in poor houses in thickly populated areas close to the industrial plants in which they work. The richer move out to the suburbs with their cleaner air and they have jobs that expose them less to smoke and fumes. Bronchitis is commoner in coal miners than in most other industrial workers. This cannot be fully explained by the effect of dust underground, because their wives also have a higher incidence of bronchitis than other men's wives. It is worth bearing in mind that this may have something to do with the miners' rather generous supply of concessionary coal and the way in which it is burnt.

Bronchitis is also much commoner and much more commonly fatal in smokers than in non-smokers. It has been shown, for example, that British doctors who smoke 25 or more cigarettes a day are six times as likely

to die from bronchitis as non-smokers. The cigarette smoking townsman is therefore exposed to a double danger—that of dirty air and cigarette smoke. Indeed about one person out of every ten who lives in a town and smokes cigarettes gets lung damage from which he suffers and from which he eventually dies.

This is some of the evidence that links smoke pollution and tobacco smoking with chronic bronchitis. There is no other reasonable explanation. It is no good trying to blame motor car and diesel fumes for this problem was with us in this country long before such engines were at all common. Pollution of the air from any source is undesirable and there is every reason for suppressing diesel fumes, but the evidence indicates that they can only play a very very small part in causing bronchitis in this country. In Los Angeles in the United States, however, there is a special form of air pollution which irritates the eyes and the breathing tubes. This is caused by the effect of sunlight on the exhaust fumes of motor cars. So far at least we are spared this nuisance, because our cars are fewer, their engines are much smaller (so they burn much less petrol) and our sunlight is scanty.

The Bronchitis Picture

It is now worth considering what this disease called chronic bronchitis is like. In its early stages it is very unspectacular and comes upon one in a stealthy way. The first symptom is a cough with perhaps a little clear phlegm which lasts a long time. This is so common and so unremarkable that many people when asked if they have a cough will say "No"—even though they have been heard to cough. When pressed they will say: "Oh, I've only got a normal cough" or "a morning cough" or a "smokers cough". Yet every adult who has such a cough for as long as three months for two or three consecutive winters already has chronic bronchitis in its early stage—a disease which may well become crippling and fatal. To begin

with there is no other symptom. But after a while—perhaps several years, but sometimes sooner—the cough gets rather worse. The victim also finds that when he gets a cold or a sore throat, it goes down on to his chest, but instead of clearing up in a week or so it drags on. At such times the phlegm often gets thicker and yellow. After a few more years, these winter colds put him off work and he gets short of breath with them. By this time, too, the cough usually fails to clear in the summer. A little longer, and he begins to dread the coming of winter. Getting up in the morning becomes a laborious business of coughing, spitting and wheezing and getting to work becomes a struggle. Then with the first cold or the first fog of winter, he becomes much worse and is very ill and fighting for his breath. He gets over it with antibiotic treatment but may not get well enough to go back to work that winter. He may then lose his job or have to take a lighter one with less pay. Soon he will be a permanent and demoralized invalid, usually by the age of 60, often by the age of 50 and sometimes considerably earlier. He leads a pretty miserable life, mostly indoors because of the difficulty of getting about. His wife often goes out to work to escape from his spitting and grumbling and to earn money to keep the home going. The whole atmosphere of the house is dominated by the incurable invalid. When death comes in one of the crises, one often cannot feel sorry that he has been relieved of his misery. And an impoverished widow remains. We spend over £20 million a year treating this condition, but we can't cure it, only relieve it to some extent. It causes the loss of 30 million working days a year, and this adds up to about £100 million in lost wages and production. But this is a condition which is largely in our power to prevent. The doctors can't do much about it. The problem is clearly in the hands of the local authorities and the general public.

This is the picture I want you to keep before you—and to some of you

it may be more than a picture but a close and terrible experience—this is the picture I want you to keep before you when you think or hear about the cost of clean air. This is the picture I want you to remember when you say: “There is nothing so cheerful as a coal fire on a cold day”—because that coal fire is by now the major factor in producing this misery. Remember that this is the fate of one man in ten who smokes cigarettes and lives in an area with dirty air. To reduce this misery is it too high a price to have some fires that are more difficult to light?—one of the grumbles about smokeless fuel. An open coal fire is cheerful but we do not really miss it on a warm summer’s day. We welcome it in winter because it produces a lot of heat in one spot—but nearly every other nation in the world prefers all over heat in the house, provided by closed stoves, gas or electricity. We are moving in that direction now and the day will eventually come when few houses will have a living room with suffocating heat from an open fire and the rest of the house cold and damp. This tradition of having one hot room and the rest of the house freezing is a very primitive one. It also seems to be bad for our health. Any bronchitic will tell you how much worse he gets after moving from the living room to the cold bedroom. Overall heating of the house will cost more—perhaps the price of three cigarettes a day—or, for a year, less than that week’s wages the man didn’t lose because of bronchitis. It is no good trying to avoid smoke control areas because widows and old age pensioners can’t afford the extra cost. What we must do for them is to agitate for higher winter pensions. And remember the reasons why so many have become widows—bronchitis itself makes over 20,000 new widows a year and cancer of the lung makes another 20,000. Remember too how much better off many pensioners would have been but for the fact that they lost so much work or retired early because of the ravages of bronchitis. I am not even sure that the extra cost could not be saved by less

washing of clothes, less rotting of fabrics and less cleaning and painting of houses that would come about with clean air.

The ironical thing is that where the problems of bronchitis are highest, those are just the areas doing the least about clean air. The fact that we produce coal in the East Midlands is no excuse for burning it inefficiently to produce dirty air on the surface to add to the hazards of mining. Let us burn the coal efficiently in proper appliances and in power stations.

Lung Cancer

Let me say something fairly briefly about pollution and cancer of the lung. There is no doubt whatsoever that cigarette smoking is the main cause of lung cancer. A large number of investigations in many countries have shown that cancer is commoner in smokers than in non-smokers and the heavier the smoker the more likely the cancer. A person who smokes 40 cigarettes a day has 30 times the risk of developing lung cancer than a non-smoker; for 20 a day the risk is about 16 times greater and for 10 cigarettes a day the risk is 10 times greater. If at the age of 55 you smoke 25 cigarettes a day your chances of dying from lung cancer before you are 65 is one in 20. These are the facts and no amount of wriggling by the tobacco companies or by those who don’t want to stop smoking can get out of them. Atmospheric pollution does play a part. A town dweller who smokes has a moderately higher risk of developing lung cancer than a countryman who smokes the same amount. And a non-smoker is more likely to develop lung cancer if he lives in a town than in the country. But a non-smoker in the town is at much less risk than a smoker who lives in the country. If we did have clean air we would at least get some reduction in the lung cancer deaths but nowhere near what we would get if people gave up smoking. Then we might well be able to cut the 25,000 annual deaths to somewhere below 5,000.

Gas Industry Need for More Capital

The growth in the use of gas for heating for most purposes has led to a revision of plans by the British gas industry. Plans to 1970 are now being based upon an expected expansion in annual demand of $7\frac{1}{2}$ per cent instead of 3 to 5 per cent envisaged in 1963, and of at least 10 per cent in peak load. As a result, the industry is faced over the next five years with considerable increases in capital expenditure and the limit of its borrowing powers (£650 million) laid down by Parliament in 1963, will be reached much sooner than expected. Increased borrowing powers are, therefore, being sought.

The industry is well placed to meet the expected large increase in demand for gas economically because of the new technological developments. New methods of gas manufacture, working continuously at high pressure, and using petroleum products—mainly light distillates—as feedstock, enable both capital and running costs in production and distribution to be significantly lower. The importation of regular supplies of liquid natural gas into Britain provides a further cheap source of gas supplies. There are, too, possibilities of obtaining other supplies of natural gas—from beneath the North Sea, if commercial quantities are discovered there, from the vast fields already proven in Holland, or (as reported on another page) possibly from Nigeria.

The industry estimates that new investment and additional working capital requirements to the end of 1970 will need financing to the extent of a further £830 million, of which £430 million—52 per cent—will come from internal sources. (This is a higher rate of self-financing than that achieved to date.) To take account of the possible effects of such developments as the discovery of large-scale deposits under the North Sea, it is felt that a margin of £200 million should be allowed. The gas industry

is, therefore, seeking to raise the limit of its borrowing powers from £650 to £1,200 million.

Present estimates involve an increase in gas sales of 45 per cent by 1970, and an increase in productivity of about 25 per cent over the same period, (allowing for an expected reduction in manpower of about 5 per cent). Details of the industry's forecasts and development plans to 1970, together with an outline of progress to date and a review of the present situation appear in a new brochure "The Growing Gas Industry", published by the Gas Council.

"FUEL ECONOMY"

Readers of this journal will be gratified by an editorial comment in *Fuel Economy*, the Federation of British Industries' annual publication on fuel efficiency: "The total saving [resulting from the work of the National Industrial Fuel Efficiency Service over the past ten years] has been estimated as at least 15 million tons of coal or its equivalent". Since this represents about 30,000 tons of coal which would have otherwise polluted the atmosphere, the gratification is justified, but there is still plenty of scope for further saving.

Of particular significance to those involved in the struggle for cleaner air is the article on *Dispersion of Gases from Chimneys*, by the Director of the Warren Spring Laboratory.

An article on Netherlands natural gas is of topical interest in view of the search now going on in the North Sea for reserves of this fuel, considered to be free from air pollutants when burnt.

The review includes well documented and illustrated articles on *The Efficient Use of Coal in Shell Boilers*, *Instrumentation and Controls* and *Gas Turbines for improved Process Control*. Its 150 pages will be invaluable to all involved in the problems of fuel economy and fuel efficiency.

Not Clean Enough

With the above heading the following article appeared in the "Western Mail" on 14 August. We would like to express our appreciation of the article as well as for permission to reproduce it.

HOW clean is the air in Welsh towns? The annual review of the National Society for Clean Air points once again to the reluctance of local authorities in the Principality to set up smoke control areas. In the nine years since the Clean Air Act was passed, only two, Newport and Pontypridd, have chosen to do so. The majority of Welsh local authorities have always maintained that the relatively low level of atmospheric pollution in their areas, due to the widespread use of clean household fuels, would not justify the cost to ratepayers of complying officially with the Acts requirements for smoke control areas.

This argument has, in time, worn rather thin. There can be little doubt that the overall problem of atmospheric pollution is growing rather than lessening. Welsh local authorities will not be able to remain indefinitely outside the clean air policy of the rest of the nation. The fact is that statutory powers must be available to

enforce this policy if it is to be fully effective. Since the enforcement of the Clean Air Act life in the worst areas of Britain has become immeasurably safer; there need be no fear of a repetition of the tragic four-day smog in London which resulted in more than 4,000 deaths.

Historically, the use of anthracite, Welsh steam coal and other relatively smokeless fuels has given towns, particularly in South Wales, fairly clean air. This situation, however, has been affected in recent years by industrial pollution and the fact that lower-grade Midland coals are being used increasingly for domestic heating. It may be true that pollution is, on average, low in South Wales, but black spots exist none the less.

There is everything to be said for the creation of smoke control areas in these black spots and for the gradual extension to cover all urban areas. This need not be a heavy burden on public money if it is true that there is at present no pollution problem to deal with. The advantage, as in all preventive public health policy, would be to give the authorities statutory power to prevent such a problem from developing.

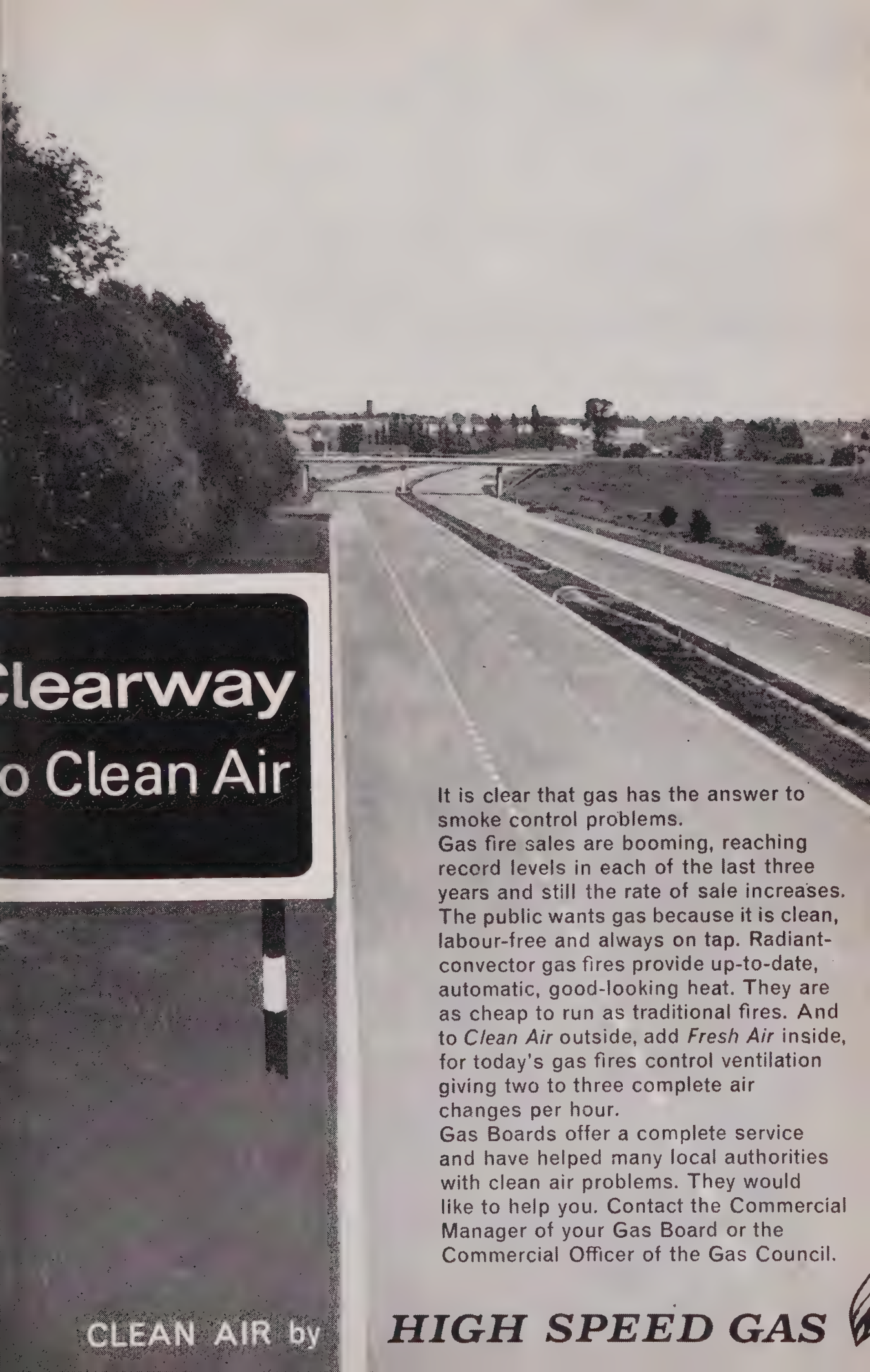
The Russian View

An interview was published in *Medical News* of 28 May with Dr. Nikolai Fedotovic Izmerov, newly appointed assistant director general of the world Health Organization in Geneva. He is described as a Soviet expert on air pollution, to which he is so devoted, he said, that it is almost his hobby.

The air pollution control approach in the U.S.S.R., he said, was a strictly physiological one. "We want the air to contain no concentration large enough to change any physiological function". They go further, he continued. First they study and

detect the action of noxious substances not on human functions or lungs but on shrubs such as those used for decorative purposes in parks. The maximum permissible concentration for Man was based on these indicator plants.

Among many other interesting points mentioned in the interview Mr. Izmerov said that a special institute was working to design a completely new petrol engine to ensure complete combustion. They preferred to concentrate on this rather than on catalysts. In certain cities and health resorts diesel transport was forbidden because of the exhaust fumes.



Clearway
to Clean Air

It is clear that gas has the answer to smoke control problems.

Gas fire sales are booming, reaching record levels in each of the last three years and still the rate of sale increases. The public wants gas because it is clean, labour-free and always on tap. Radiant-convector gas fires provide up-to-date, automatic, good-looking heat. They are as cheap to run as traditional fires. And to *Clean Air* outside, add *Fresh Air* inside, for today's gas fires control ventilation giving two to three complete air changes per hour.

Gas Boards offer a complete service and have helped many local authorities with clean air problems. They would like to help you. Contact the Commercial Manager of your Gas Board or the Commercial Officer of the Gas Council.

CLEAN AIR by

HIGH SPEED GAS

CONTRIBUTIONS TO CLEANER AIR

Industrial and Commercial News

NEW BOILERS FROM POTTERTON

Thomas Potterton Limited, the heating equipment manufacturer, has introduced a completely new range of Diplomat gas-fired boilers.

The existing domestic gas-fired range of three units has been replaced by five new, "range-rated" appliances with outputs from 30,000 to 80,000 Btu/h, giving complete coverage of the main consumer central heating market. Not only are there more units to choose from, but each appliance has the facility of "range-rating" which allows the installer to regulate the output of the boiler so that it more exactly meets the designed heating load. In some sizes this allowance is as much as 10,000 Btu/h.

When a boiler is range-rated correctly, it works on a more continuous cycle without incessantly cutting in and out on the thermostat, thereby improving the effective efficiency of the unit (an important factor in keeping fuel bills to a minimum). This range-rating feature is unique and these new units are the first of their kind to appear on the gas central heating scene.

Standard Kitchen Height

In addition to this innovation, the boilers—cartoned so that they arrive in the home in the best possible condition—are supplied with new casings all 36 in. high, the same height as the standard kitchen unit. The new boilers also provide warmth into the kitchen itself (in the largest size, as much as 4,000 Btu/h is dispersed as direct heat). This reduces the requirement for radiator surface in the kitchen, a great asset in the modern kitchen where every foot of wall space is at a premium.

After extensive market research, Potterton have decided to concentrate on producing three main types of gas-fired boiler—all of which have either been designed for use with a small bore system or can easily be adapted to suit. This means that fewer varieties of components are required during production and thus costs are reduced. In this way Potterton have been able to introduce this most comprehensive range of gas-fired boilers at a competitive price.

The new range has replaced all existing Diplomat basic and small bore units of similar outputs, except for the room-sealed versions which will continue to be offered both cased and uncased, at outputs of 44,000 and 67,000 Btu/h, but with new combination controls. The 31,000 Btu/h room-sealed unit has been discontinued. The larger Diplomat boilers with outputs from 100,000-250,000 Btu/h remain unchanged, as does the fast selling Potterton 30+3.

RADIATION'S EXPORT SUCCESS

More than 300 domestic appliances per working day were despatched abroad during 1964 by Radiation International Limited. Among the "famous name" products sold overseas were New World gas cookers, Radiation gas fires, Ascot gas water heaters, Parkray central heating units, Parnall home laundry appliances, Jackson electric cookers and Radiation catering equipment.

Notwithstanding the ruthless competitiveness of the market in consumer durables, Radiation International have succeeded in increasing their exports by 40 per cent over their 1963 total.

A network of Agents and regular customers has been established in almost 100 countries, and a continuous connection has been maintained both personal and by correspondence.

The Group's products are also being manufactured under licence in Australia, New Zealand, Mexico, Colombia and Spain.

Parallel efforts are being made to create markets for the Company's products on the Continent of Europe. For this purpose, Radiation Limited set up a subsidiary company in Holland under the name of Radiation (Nederland) N.V.

It is worthwhile to record that the first foreign-made gas room heater to be approved to their own standards by the Gas Institute of Holland was the "Crystal-glow"—a Radiation model—so was the second—the Radiation TEN.

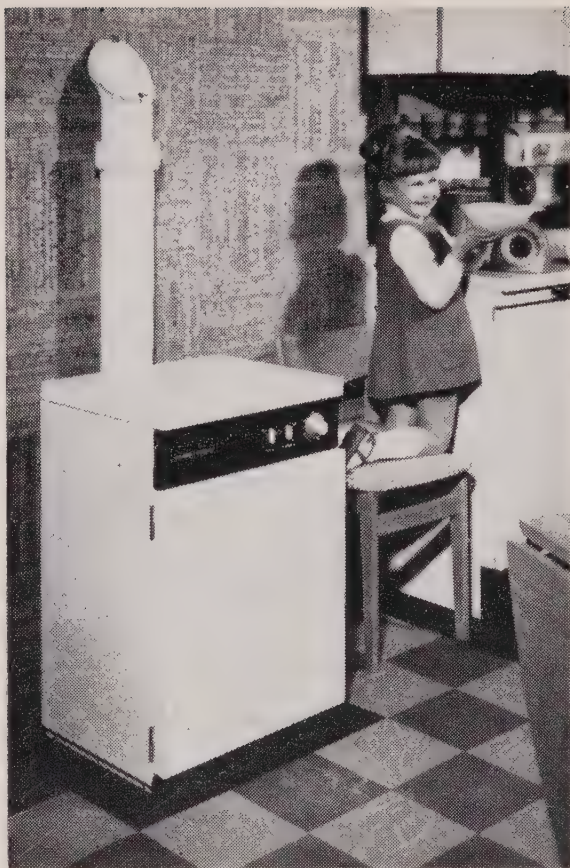
Steel Castings Research Report

The 12th annual report of the British Steel Castings Research Association very properly comments on the paucity of financial resources that has necessitated a slight depletion of reserves to enable its level of research and service to members to be maintained.

The report goes on to describe a series of Open Days held in June and July 1964. Two Conferences were held, the first on non-destructive testing in steel foundries took place in York in April 1964 and was attended by 106 delegates, the second, on developments in steelmaking and metallurgy in steel foundries at Harrogate in October coincided with the Society's own conference and attracted over 200 delegates.

Discussion groups were held in Sheffield and Glasgow. Research has continued on oxygen injection in steelmaking, the desulphurization of liquid steel and high tensile cast steels—the latter demonstrating that it was not possible to find any relationship between sulphur content and either impact or tensile properties. Other research encourages the view that it is possible to produce rather cleaner steels.

Much research effort has been centred on foundry processes and moulding materials and aspects of plant engineering and industrial health. In connection with the atmospheric pollution tests on a pilot scale CVX



The new Vulcan 33 Gas-fired boiler, manufactured by Hattersley Bros Ltd, Swinton, Mexborough, Yorks. Recently approved by the Gas Council and available in three sizes

Wet Gas Scrubber it was found that the equipment was not suitable for the cleaning of fume from oxygen steel-making to a degree acceptable to the Alkali Inspectorate.

The report mentions dust surveys that reveal a general improvement in the situation and 35 projects currently proceeding are listed, as are the members and committees of the Association.

Company report

COALITE PROGRESS

The Coalite and Chemical Products Group made a net profit of £915,000 for the period ending 31 March, 1965, an increase of £148,000 on last year. This was announced by the Chairman, Commander Colin Buist, at the annual general meeting on 28 July.

In spite of the cutback by Local

Authorities in the number of premises coming within Smoke Control Areas in 1964, production of solid smokeless fuel was stepped up and sales of Coalite rose 20 per cent over last year.

The increase in excise duty on home produced motor fuel from 1s. 6d. to 2s. 9d. per gallon forced the group to discontinue the manufacture of petrol and diesel oil. The loss of these valuable coal by-products necessitated an increase in the price of Coalite from 1 May. The demand for other oils and chemicals kept pace with increased production and an agreement was concluded with East Germany for the company to supply technical information and advice on the construction of a herbicide plant in that country.

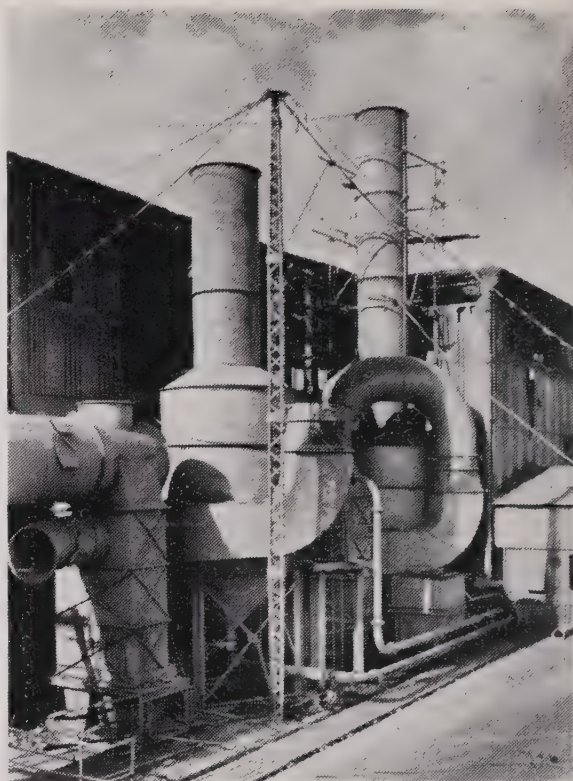
The chairman announced increased spending on research and development and expressed confidence in the company's future.

NEW COALITE WORKS

Coalite and Chemical Products announce that they are to build a new "Coalite" Works at Grimethorpe, near Barnsley in Yorkshire. Satisfactory arrangements have been made with the National Coal Board for the supply of coal on a long term basis and for the lease of a site adjacent to Grimethorpe and Ferrymoor Collieries. Other Consents, including planning permission, have been obtained. The New Works will convert 550,000 tons of coal per annum into "Coalite", Oils and Chemicals. Work on the site has commenced and it is expected that production will start in October, 1966.

CVX Wet Gas Scrubber

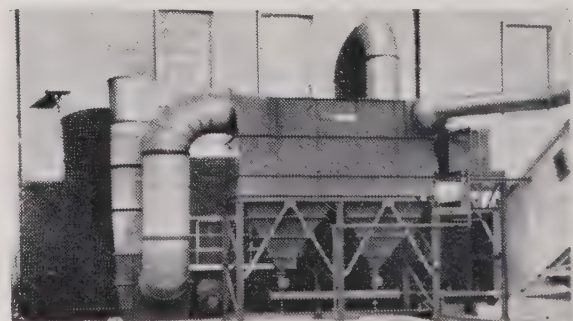
Despite its inadequacies as a gas remover in oxygen steelmaking (as revealed in the annual report of the British Steel Castings Research Association) the CVX Wet Gas Scrubber manufactured under U.S. patent by Techno Handling Ltd., Brown Lane, Leeds 11, has already proved effective as a dust remover at a leading cement works in this country. The inlet burden is of the order of two grains per cubic foot at



The CVX Wet Gas Scrubber

180°F. and emission is well within the Alkali Inspectorate's requirements.

The simplicity of CVX design, revealed in the accompanying illustration, contributes to lower first cost operating and maintenance costs. The makers claim that the water requirements of this piece of equipment are lower than any known wet scrubber.



Wet deduster, showing method of sludge disposal via pumping unit, designed and manufactured by Dust Control Equipment Ltd., Leicester, in service at the public salvage composting plant using the Dano system, at Kilmarnock. Photo by General Engineering (Radcliffe) Ltd., the main contractors

AIR POLLUTION ABSTRACTS

800. Evaluation of Vegetation Injury as an Air Pollution Criterion. Treshow, M. (Journ. of the A.P.C.A. June, 1965, **15**, No. 6, 266-269). Foliar markings on vegetation have proven a highly sensitive criterion for the presence of many air pollutants; proper evaluation of such effects can serve as a valuable and inexpensive tool for delineating an air pollution condition. Injury symptoms from fluoride, sulphur dioxide, photochemical oxidants and other pollutants have been described and can be recognized by experienced observers. Field studies provide a valuable technique for appraising an air pollution problem when diagnosis is not confused by other factors. Careful inspection can avert difficulties arising in diagnosis where similar symptoms are produced by agents other than air pollutants. Several factors must be considered in appraising injury. These include a knowledge of the relative sensitivity of plant species to various pollutants, the syndrome of injury on a number of plants and species, and distribution and geographic relation of affected plants to be the suspected source. Background information on cultural, environmental, disease and insect conditions which might be responsible for, or modify, foliar markings or chronic effects in question must also be understood. For some pollutants a chemical analysis of foliage and air may prove helpful. When these factors are studied, the presence, distribution and magnitude of an air pollution situation can be evaluated, thus providing a sensitive criterion of air quality.

801. Some recent results concerning the reduction of pollution by the stratified charge I.F.P. process. Baudry, J. (Society of automotive engineers January 1965, 974 B) (CIDITVA No. 22). The paper describes the reduction in observed unburned exhaust products when a spark ignition engine is operated with the I.F.P. process of variable mixture strength. The principle of the process is first explained; then the influence of the mixture strength on carbon monoxide and hydrocarbons in exhaust gases is shown. A comparison of normal carburetion processes and I.F.P. process, based on a stratification of the intake gases, shows how the extension towards the lean

mixtures of the limit of the mixture strength results in the reduction of unburned products in the exhaust gases.

802. Experimental Study of Threshold Limit of NO₂. Wagner, W. D. et al. (Arch. Env. Hlth., March, 1965, **10**, No. 3, 455-466). Six species of laboratory animals were exposed daily for periods up to 18 months to pure nitrogen dioxide at closely controlled concentrations of 5 p.p.m., the present threshold limit, and levels one fifth as high, 1 p.p.m., and five times greater, 25 p.p.m. Control groups were used throughout the studies. At no exposure level did changes in body weight, hematologic values, or biochemical indices deviate significantly from the control data. Tolerance in aging rats and mice to acute lethal effects of NO₂ following extended periods of development from exposure at 5 p.p.m. and 25 p.p.m., was achieved to a significant degree. Detailed histologic evaluation of tissues of serially sacrificed exposed animals and their controls presented no evidence, with any of the animal species used, that nitrogen dioxide, in the concentrations employed and in the duration of exposures, had any demonstrably morphologic effect on either production of pulmonary lesions or the susceptibility of the animals to a pulmonary inflammatory process. These data present reliable evidence for the present 5 p.p.m. threshold limit value for nitrogen dioxide, with the added caution that 5 p.p.m. should represent a ceiling on the basis of suggestive lung tumorigenesis.

803. Significance of Atmospheric Ozone as a Phytotoxicant. Richards, B. L. and Taylor O. C., (Journ. of the A.P.C.A. May 1965, **15**, No. 5, 191-193). Since the recognition of ozone as a major phytotoxicant in crop plants in 1957, ozone type symptoms have been observed in a wide range of vegetation. These observations include leafy vegetables, field forage, and textile crops, also shrubs, broad-leafed ornamental, fruit and forest trees, and various conifers. Fumigation experiments at various institutions have confirmed the etiological relation of ozone in many of these observations. Such visible injuries fail to provide a reliable index to the damaging impact of ozone on the numerous plants affected.

Hidden injury or damage by ozone at sub-necrotic levels has been reported and experimentally established in a number of crop plants. Evidence is available which indicates that citrus varieties are so affected, and that much of the citrus decline in Southern California may be ozone induced. Photochemically induced ozone may prove to be the most persistent, if not the most difficult, of atmospheric phytotoxicants to control. Ozone type injury has been reported from eighteen different states, and from Canada to Japan.

804. Short and Long-time Measurements of SO₂ traces in the Atmosphere by means of a modified Pararosaniline Method. (In German) Herrmann, G. (Staub, July 1965, **25**, No. 7, 271-273). It is shown how SO₂ determinations according to the pararosaniline method may be rendered essentially more expedient if a measuring error of 15 per cent is accepted. The measuring range, in the case of an air sample of 10,1, is 0,25 to 2,9 mg/m³ SO₂. Short-time measurements (8 minutes) in field and on site by means of a portable apparatus, and also the determination of average daily values (with the help of a special aspirator for low air flow rates) require very little work and, after instructing the technical assistants, may be carried out without the use of a laboratory.

805. The Recording Measurement of Gaseous Immission Concentrations with a New Analyser. (In German) Fuhrmann, H. (Staub, July 1965, **25**, No. 7, 266-270). For monitoring gases contributing to air pollution, SO₂ and NO + NO₂ and O₃ in particular, recording analysers find increasing application. The paper describes an automatic colorimetric analyser for the repetitive measurement of immission concentrations. The instrument is characterized by high sensitivity down to a few µg/m³, excellent selectivity, and minimum maintenance requirements. Simple switchover means permit the same instrument to be used for both half-hour mean values and short-time readings. The Imcometer described by the author is designed for simple and rapid changeover to various gaseous components. It has been fieldtested in a northern suburb of Hamburg. The recorded daily readings for SO₂, NO + NO₂ and O₃ are discussed.

806. Does Urban Life Menace our Health? Debat, J. Dr. (In French)

(Pollution Atmospherique, April/June 1965, **7**, No. 26, 1571-65). During one century, the progress in medicine has raised the expectation of life from 39 to 68 years. But during the same period, due to the rise of industry which has turned our living conditions upside down—especially by increasing the numbers of urban population—there is a risk, if certain concentration limits are exceeded, that there may be a regression in human longevity. The results of recent statistics seem to suggest this. Atmospheric pollution, noise, agitation, disharmony with the environment—all contribute to lowering the physical and mental health of the city dweller. It is only by fighting each of these elements that we can hope to restore to the twentieth century man the well-being which he now can claim. There are solutions which should now be applied without waiting any longer, in the great urban conurbations and especially in the Paris region. The regulations concerning the fight against atmospheric pollution seem insufficient to the author and he suggests some other measures relating to the burning of fuel and pollution from vehicles which he considers should be adopted quickly.

807. The Bag Filterhouse for Oil-Fired Power Plants. Gosselin, A. E. (Journ. Air Poll. Control Assn., April 1965, **15**, No. 4, 179-180). The paper describes experience gained with a pilot plant bag filterhouse to control plume capacity and sulphur trioxide content of flue gases from oil-fired boilers. The system is claimed to have no commercial equal in collection efficiency, and it was established that the reaction of an alkali additive (Dolomite) with the SO₃ reduced the acid dewpoint of the flue gases to less than 120°F and that an overall particulate collection efficiency of 99.9 per cent could be consistently expected.

808. Coal Utilization and Atmospheric Pollution. Rohrman, F. A. et al. (Coal, April 1965, **19**, 5-7). In discussing the topic of coal utilization and atmospheric pollution, the authors have focused attention on sulphur since it is the prime pollutant in coal. Several remedies including the present trend toward locating power plants in less populated areas; including treating coal and or the fuel gas, applicable to existing plants are discussed. The economics of the various treatments are still to be determined. Improvements in combustion efficiency and control of particle emissions have

made it possible to eliminate a large percentage of smoke, soot, and ash emissions from large coal-burning installations.

809. Automotive Air Pollution. A report of the Secretary of Health, Education and Welfare to the U.S. Congress Pursuant to PL 88-206, the Clean Air Act. Senate Document No. 7, 89th Congr., 1st Session, 1965. 22 pp. (Div. Air Poll. U.S. Dept. of Health, Ed. and Welf. Washington D.C. 20201). By the provisions of a section of the Clean Air Act, the secretary of Health, Education and Welfare of the U.S. is to report to the Congress one year after enactment of the section and semi-annually thereafter on measures taken toward the resolution of the vehicle exhaust pollution problem and efforts to improve fuels. This report dated December 1964 discusses current automotive pollution problems under the headings of: Incidence of photochemical smog. Effects of automotive air pollution. Vehicle use trends. Recognition by State governments. Progress in the resolution of the problem is considered under the headings of: Exhaust emission control. Crankcase emission control. Fuel evaporation loss control. Maintenance. Fuels. Diesels. There is a bibliography of 107 references to the current literature.

810. Oxides of Nitrogen in Diesel Engine Exhaust Gas: Their Formation and Control. McConnell, G. (Proc. Inst. of Mech. Engrs., 1963/64, Vol. 178, Part 1, p. 1001). Interest in the emission of oxides of nitrogen in diesel engine exhaust gas stems largely from the air pollution problem which arises when diesel engines are operated in confined spaces. The author describes tests which have been carried out at the B.P. Research Centre, when oxides of nitrogen concentrations were measured on three engine types over a range of operating conditions. Based on the results of these tests, a theory is presented for the formation of nitrogen oxides in the engine cylinder, and general principles are laid down for their control. The author concludes with recommendations concerning choice of engine type and operating conditions to ensure a minimum discharge of nitrogen oxides.

811. The Diesel Engine Exhaust Problem with Road Vehicles. Savage, J. D. (M.I.R.A.) D.E.U.A. Paper, February 18, 1965, 9 pp.). The fact that Diesel-engined vehicles can emit visible exhaust at street

level has increased public concern at their effect on atmospheric pollution. Since too the emission of black exhaust smoke is known to be avoidable, legislation to control such emission is under consideration in various countries. Excessive exhaust smoke may arise from engine factors (loss of compression, lack of air or a cold engine), injection-pump factors or injector factors. Injection equipment is now being designed to prevent driver interference with the maximum fuel stop and regulations now in force prohibit the improper use of excess-fuel devices. The persistence of objectionable smoke is attributable to the need for higher output, which has led engine producers to reduce the margin between maximum operating output and output at which black smoke appears. Slight engine deterioration can hence cause smoking, particularly as suitable maintenance men are scarce and spare parts expensive. The manufacturer's setting for maximum output is governed by maximum fuel input limited by the oxygen available for mixing and burning. Remedies suggested for objectionable exhaust smoke include the improvement of training facilities and conditions of employment for maintenance staff. No satisfactory after-burners, scrubbers or filters are yet available at a reasonable price. Catalytic after-burners are being studied. Devices for dispersing the exhaust have been tried. Changes in fuel quality may impair engine performance in other ways. A suitable smoke-depressant fuel additive, if found, might prove of doubtful value. Drivers should know the best use of the gearbox. The basic tendency to produce smoke depends on engine design. Various smoke-meters are available for measuring exhaust-smoke density. A standard test procedure for rating motor-vehicle Diesel engines is desirable. Difficulties of testing hamper the application of regulations to control smoke emission.

812. Request to the Government for the continuance of the Heat Control Law. (In Japanese) (Heat and Management, June 1965, Vol. 14, No. 6). Some 280 large plants in Japan on April 26 and 27 have submitted to the Government authorities concerned, the request for the continuance of the present Heat Control Law for the sake of fuel economy as well as for air pollution prevention.

813. Air Pollution Control at Cape Kennedy. McIlouth, M. E. and Terry J. P. (Amer. Ind. Hyg. Ass. J., March-

April 1965, 26, 172-6). Larger missiles and the increased use of toxic propellants require effective planning and operations to prevent the development of major air pollution problems. Large-scale airborne sources are of an instantaneous rather than a continuous nature at C.K.A.F.S. Significant air contamination sources include missile exhausts, aborts, spills of volatile propellants, disposal of toxic materials and normal industrial or transportation activities. Abatement techniques incorporating equipment design, operations support, and environmental studies are discussed. Special emphasis is given to controls, test data, and problems associated with Titan II missile programme.

814. Polynuclear Hydrocarbon Emissions from Selected Industrial Processes. Von Lehmden, J. D. et al. (Journ. of the A.P.C.A. July, 1965, 15, No. 7, 306-312). A number of selected industrial processes considered as potential sources of benz-

pyrene and other polynuclear hydrocarbons were surveyed. Polynuclear hydrocarbon emission levels were measured directly for asphalt hot road mix preparation and asphalt air-blowing. Emissions of other pollutants including particulate matter, carbon monoxide, and total gaseous hydrocarbons were also measured, and are reported together with pertinent data on process design and operation. Results are discussed with reference to the type of process; the type of equipment used, including control devices; and other factors. The significance of some additional processes as contributors of polynuclear hydrocarbons was examined indirectly by collecting atmospheric samples of polynuclear hydrocarbons in residential areas in the vicinity of (1) a carbon black manufacturing area, (2) a steel and coke manufacturing area, (3) an organic chemical industry complex, and (4) a residential and small industry coal burning area.

Saturday Review Looks at A.P.

In a special report on air pollution entitled "The Fouling of the American Environment", the Saturday Review of Literature (a New York publication) suggests that if we want to make the air of our cities fit to breathe we must consider ways of limiting automobile travel in large urban centres. This revolutionary idea is backed by the startling disclosure that every day 350,000 tons of noxious gases are spewed into the atmosphere by America's 88,000,000 motor vehicles! The principal cities which would be affected by any ban or limit on motor travel are New York, Los Angeles, Detroit, Chicago and Washington, but only in the state of California has legislation been introduced making it compulsory to fit devices to cars which will virtually eliminate hydrocarbon emission.

All these cities have their pollution control programmes but it is Los Angeles County which leads the nation in passing and enforcing regulations to control emissions from power plants, petrol refineries, home heating furnaces and organic solvent industries. There is however, con-

siderable opposition to both state and federal legislation on pollution control and in fact, some manufacturers may find it cheaper to pay the \$100-a-day fine established by the federal Clean Air Act than to make the mandatory report on pollution to the Federal Government required by this Act when a health or welfare hazard has been established.

One of the greatest obstacles to cleaning up the air comes from the daily jam of commuters' cars attempting to enter and leave urban areas. The city of San Francisco is making a significant contribution to solving this problem by building a high-speed underground transit system which will cut travel time from the heavily populated East Bay from the present 43 minutes to 8 minutes. Other cities throughout the nation will be forced to take notice of this move.

The article concludes its survey of the pollution problem with the thought that, "Our toleration of air pollution manifests a deranged view of life in which private values run wild over public values". Indeed, Americans may well be forced to view the Great Society through gas masks.

The Case for Electric Vehicles

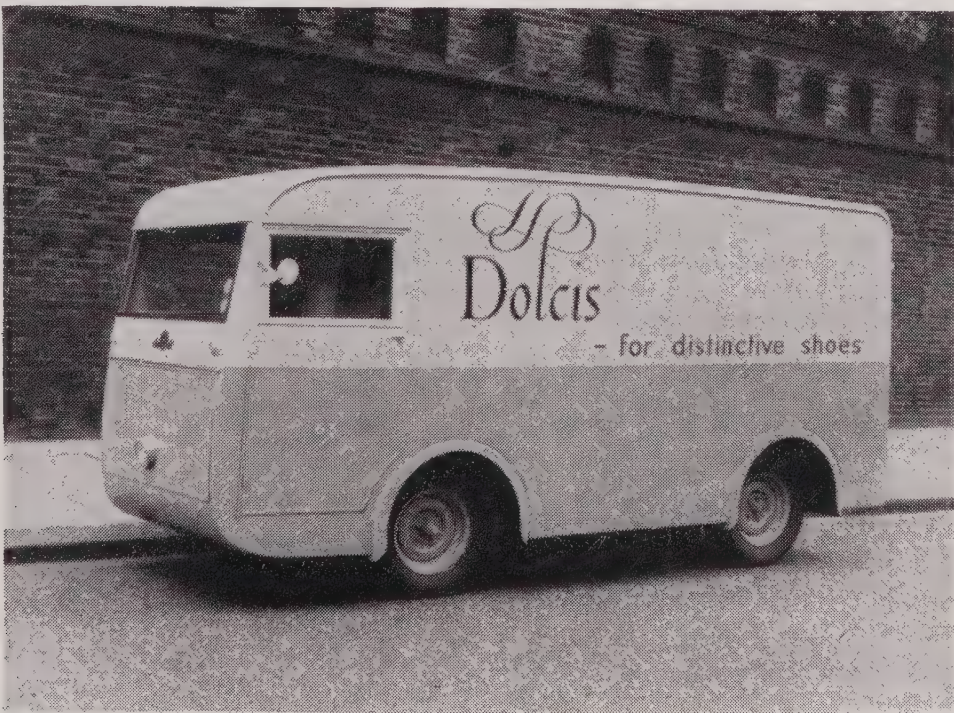
The unceasing growth of problems of congestion in town streets, together with the air pollution that is one of its—largely unregarded—consequences, may be partly overcome in the future by the banning of cars altogether from some areas—carless zones—while in others it may be checked by sweeping new restrictions. But, whatever steps may be taken as the jamming intensifies, there will no doubt continue to be too many cars, vans, lorries, taxis and buses in the streets, each adding to the pollution of the air. Where we must have vehicles, therefore, let them be as free from smoke, fumes and noxious gases as may be possible. This is where the electric battery vehicle can and should come into its own.

We have been pleased to see the memorandum of evidence submitted in the form of an illustrated brochure by the Electric Vehicle Association of Great Britain Ltd., to the "Cars for Cities" Study set up by the Ministry of Transport. This outlines the growth in the use of battery vehicles for

commercial and industrial use, mainly for short-haul purposes, and goes on to make the case for a private car, or electric runabout, for travelling from the suburbs to the town centre, for shopping and so on, over an area of 10 to 15 miles radius. The memorandum says:

"Residents, especially women shoppers, will wish to travel to the shopping precinct direct from their home. They will not relish a change of transport especially on the return journey. Their need is for a car which will travel right into any shopping area. It does not need to be a large car or a fast car and it must be very simple to drive with a minimum of upkeep. This is an accurate description of an electric 'runabout' car.

"A vehicle of the size of the present small petrol cars would be battery driven, would have a speed of 25-30 miles per hour and a range of up to 50 miles on one charge. Normal recharging would be automatic since the battery would be 'plugged in' to the mains immediately it returns to the garage. Recharging at a parking meter during the two hour period is



A 20 cwt. payload inter-factory shoe delivery van

perfectly feasible with the co-operation of the local authorities. No further attention would be required."

It is pointed out that recharging can be done anywhere where there is a supply of electricity, and that night charging can take advantage of off-peak tariffs. It may be asked why this small runabout car has not been developed. The answer is "that the many disadvantages of the engine-driven car are only now being fully realized and there has been no encouragement to develop a car with a complete absence of noise, fumes and smell, with a limited range and without motorway speeds". It is pointed out that "the removal of purchase tax from small electric cars would help to offset high costs of manufacture due to the absence of mass production techniques".

Other useful short-haul services—400 to 800 yards—that are suggested are "rickshaws" for two or three persons, electric "trains" pulling several "toast rack" trailers, and electric omnibuses operating from main line railway and coach stations, outer car parks, etc. Goods could be carried in a similar manner.

It would be a big step forward if the diesel town taxi could be replaced

by such vehicles, or by taxi versions of the private electric car. Battery recharging at taxi ranks would be a simple matter. The suggestion is also made for charging points—something like parking meters—at car parks.

The field for electric road traction seems to be open for developments of many kinds, to which the National Society for Clean Air can give unreserved support.

As a footnote to the above, we quote from a *Times* report (5 August, 1965), which began:

Experiments with battery-driven electric cars designed for use in congested city areas have reached an advanced stage in Britain. Four companies, including Associated Electrical Industries, are concerned in the joint project on behalf of the Electricity Council.

In Adelaide, Australia, yesterday Mr. Charles Wheeler, chairman of A.E.I., was reported as saying that his company had removed the engine from a B.M.C. Mini and installed an electric motor with large batteries.

It had a range of up to 40 miles, cost a farthing a mile to run, and was rechargeable overnight. The firm was also working on the idea of having a system by which the cars could be recharged at parking meters.

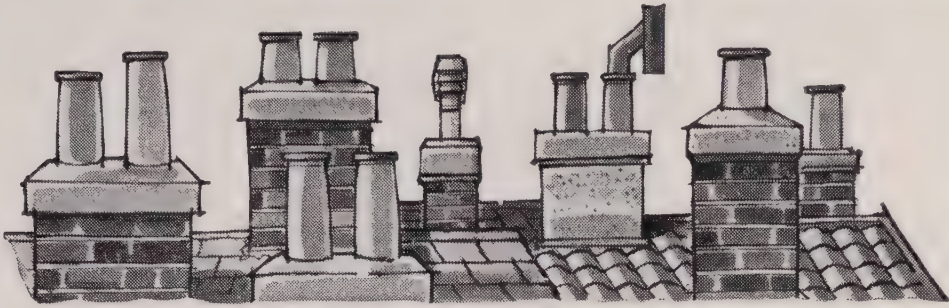
Clean Air and Water in a Complex Society is the title of a very interesting and copiously illustrated booklet, published by the giant U.S. Du Pont chemical company. Pollution is described in it as "one predictable result of the accelerating tendency of the human race to cluster in large numbers". Probably air pollution can never be entirely eliminated; it can, however be measurably reduced, provided the American people are willing to make the effort and pay the price.

Looking back, throughout history some price in fact has always been paid, since the potentials of pollution are inherent in civilization. The booklet describes the manifold causes of air pollution in an industrial

society and gives a comprehensive account of the pollution control programme at the Du Pont Company who, having been deeply concerned with this problem for many decades, has a policy that no new industrial installation will be approved unless it meets—or betters—regulations and standards for pollution abatement. In addition, Du Pont spends millions of dollars each year to bring older installations up to new standards. Detailed case studies are given which should be of considerable interest to industrial firms in the chemical field.

("Clean Air and Water in a Complex Society" Du Pont No. 28. publ. E. I. du Pont de Nemours & Company, Wilmington, Delaware 19898, U.S.A.)

You can't have smoke in a smokeless zone



but you can have a real open fire



... as long as it's a Baxi Fire

Only the Baxi Fire—with its unique underfloor air-control—burns every kind of smokeless fuel so well. It's the real answer to your district's clean air problems at a price your Council and ratepayers can afford. All Baxi fires are approved for smokeless zones by the Domestic Appliances Council on behalf of the Ministry of Power. Retail Price from £12.12.6 including fireback.

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OIL?

Shell-Mex and B.P. helps to clear the air

FOR THE HOME

From full central heating to the cheapest home heating of all, paraffin heaters—oil is helping to resolve clean air problems—efficiently, economically and advantageously. Shell-Mex and B.P. not only supply fuel to meet the demands of the Clean Air Act but also offer service to you and your ratepayers. A service unsurpassed in experience and resources and which extends all the co-operation and advice that local authorities may require.

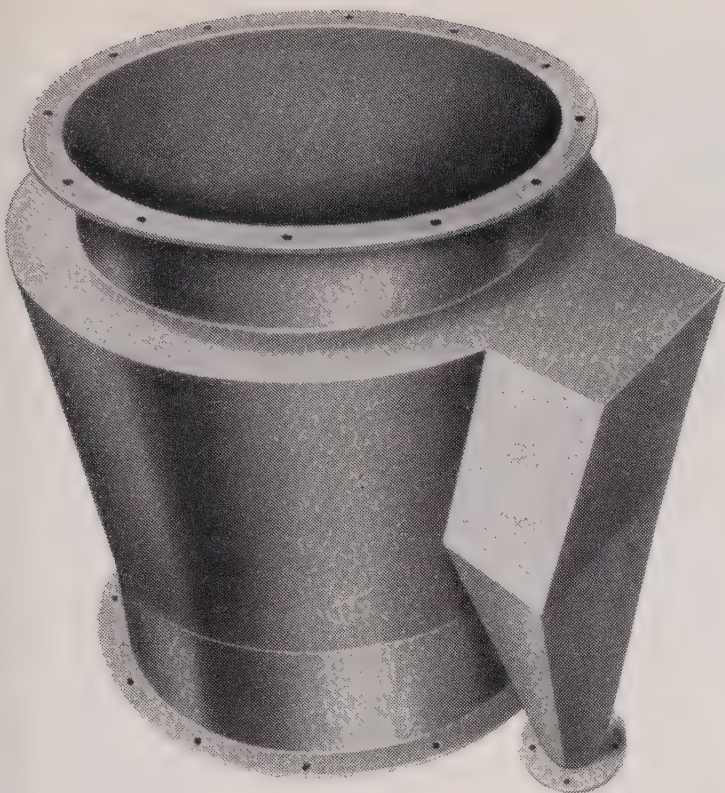
FOR INDUSTRY

Here, too, oil fuels have an answer to every problem. Again we can help you with all aspects of oil's application, including storage and handling. You may also be interested in our public service film 'Clean Air'. A 20-minute colour film made in consultation with Government departments and available on free loan.

On all matters concerning oil-firing and clean air, you are invited to make full and free use of Shell-Mex and B.P. service. This assistance can be obtained from a Shell-Mex and B.P. Industrial Fuels, or Domestic Fuels Superintendent—on request to the divisional office in your area or to head office in London.

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CLEAR THE AIR WITH A SIROCCO CHIMNEY GRIT COLLECTOR

Designed to combine optimum efficiency with low cost and minimum maintenance the Sirocco Chimney Grit Collector provides an ideal means of eliminating grit and removing a high percentage of dust emitted by small solid fuel-fired boilers, kilns and incinerators, in accordance with the statutory Clean Air Regulations. It can, in addition, be employed effectively to arrest unburned carbon smuts from oil-fired boilers, and will also serve as an efficient spark arrester.

EFFICIENCY

The "Sirocco" Chimney Grit Collector is produced in six sizes, ranging from 15" to 30" diameter. Two types are available: High Efficiency (H.E.) for chimneys where mechanical draught is employed, and Low Resistance (L.R.) for natural draught installations. In the removal of grit (particles over 76 microns) the H.E. Collector has an efficiency of 92% and the L.R. type an efficiency of 87%. The Collectors will also remove a high proportion of the finer dust, giving overall efficiencies of up to 81% (H.E.) and up to 72% (L.R.) on solids for a coarse stoker fired dust.

RELIABILITY

The greatest possible simplicity consistent with high performance has been achieved in the design of the unit. There are no moving parts and once installed this robustly constructed Collector will perform its duties over a long period.

COMBINED FAN AND GRIT COLLECTOR UNIT

In cases where it is desired to supplement natural draught to permit the installation of the high efficiency type Grit Collector, a Sirocco bifurcated axial flow fan can be supplied with the Collector, the two being combined in a single unit.

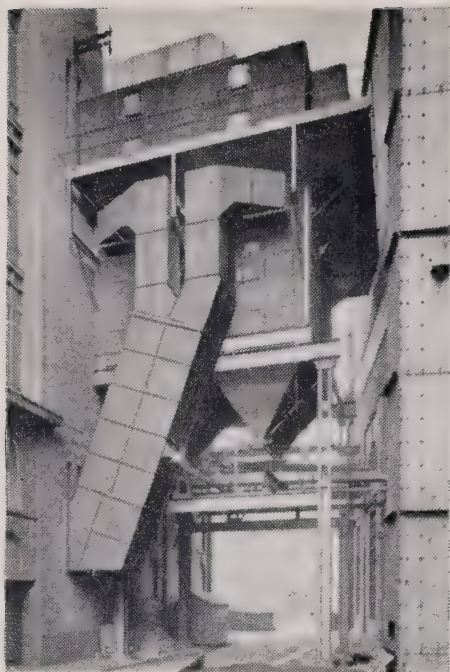
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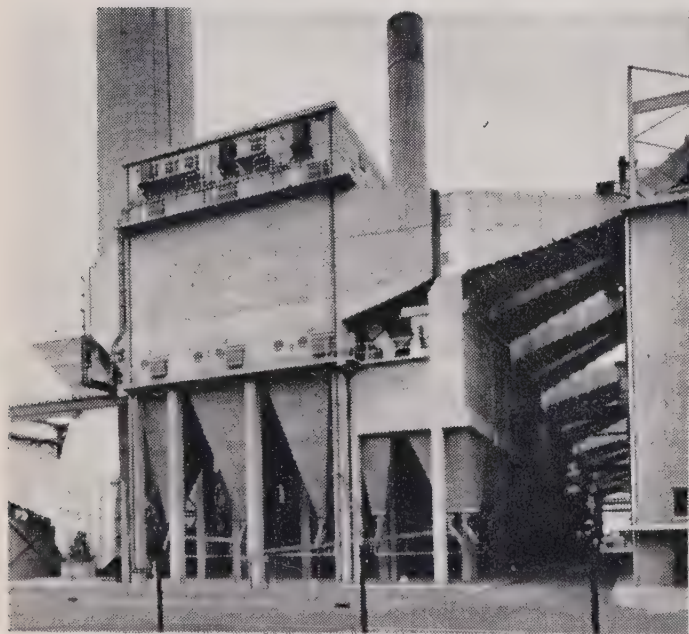
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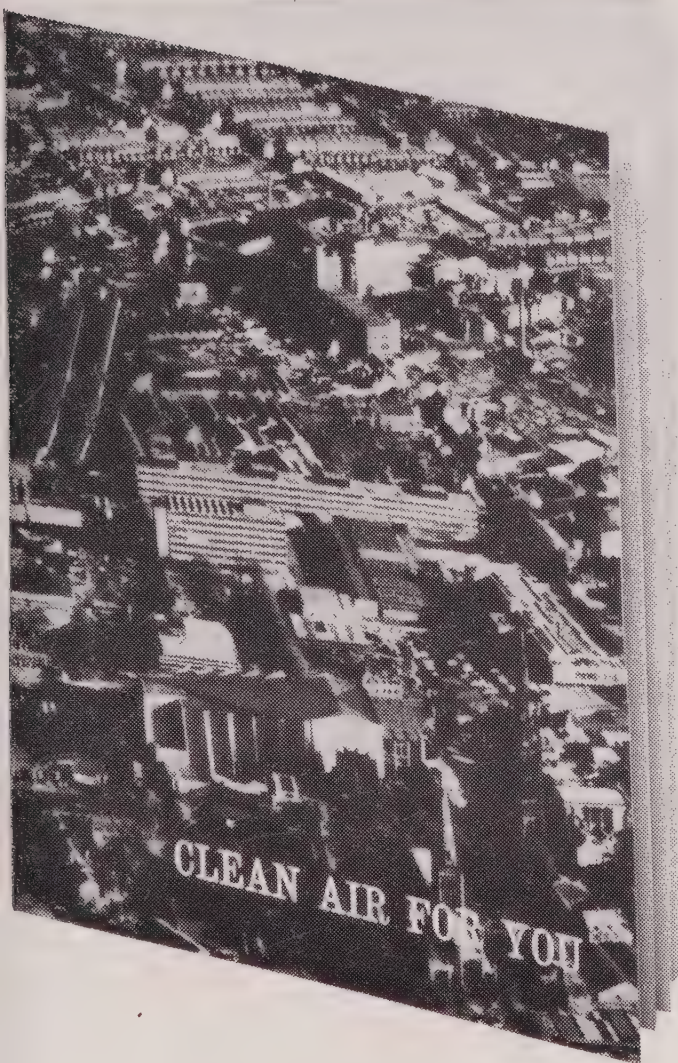
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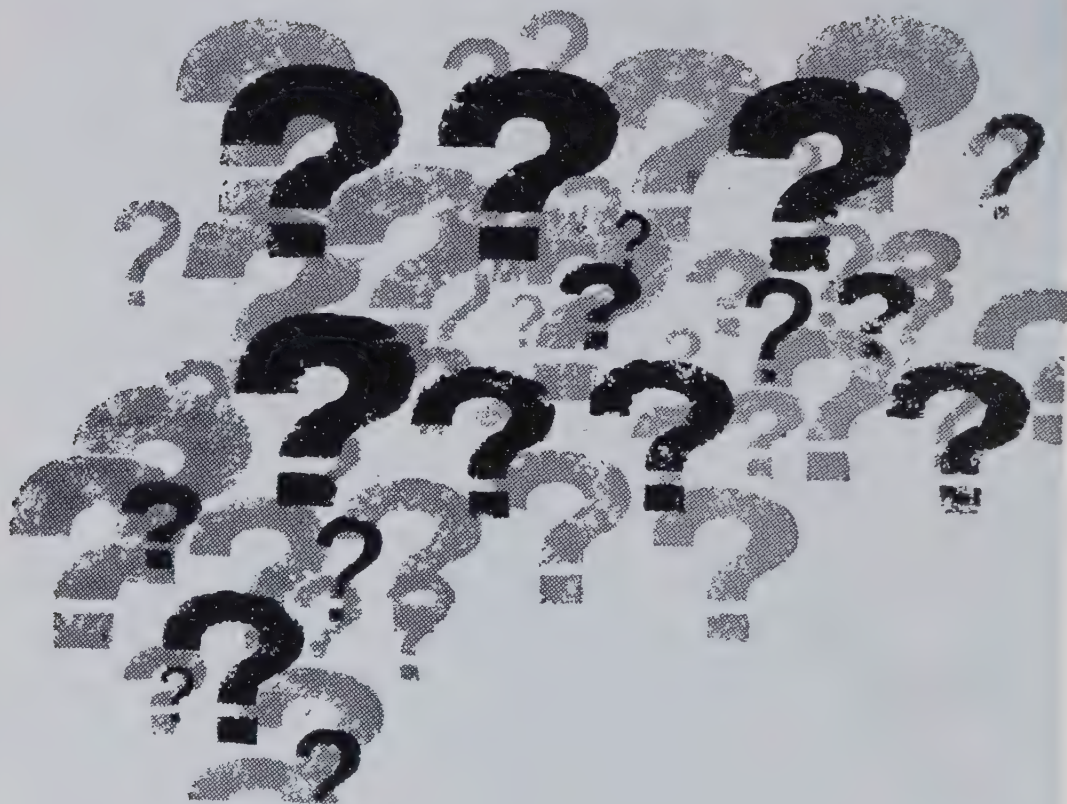


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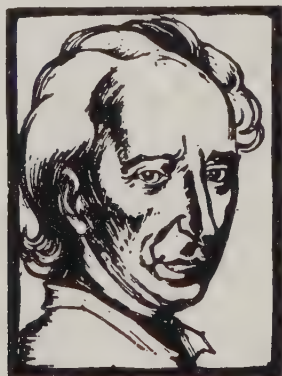
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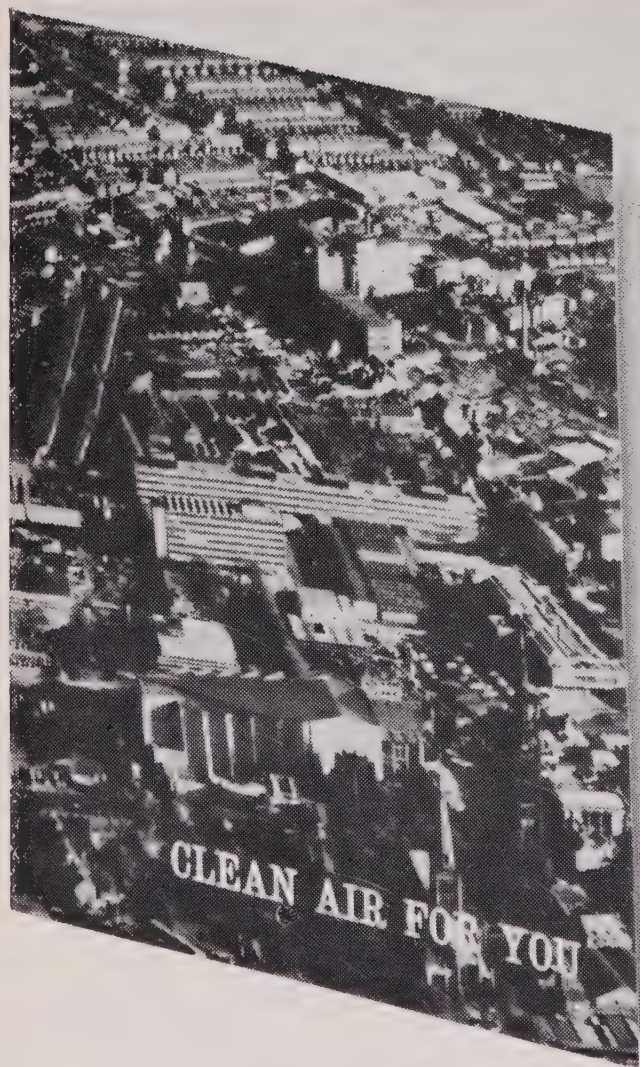


No. 136 ★ WINTER 1965 ★ 3s.

In this Issue

Eastbourne: Addresses by John Morris, M.P. and Sir Alan Wilson
Air Pollution from Power Stations ★ Education and Publicity for Clean Air
Fuel Industry Reports ★ Air Pollution Conference in Sydney

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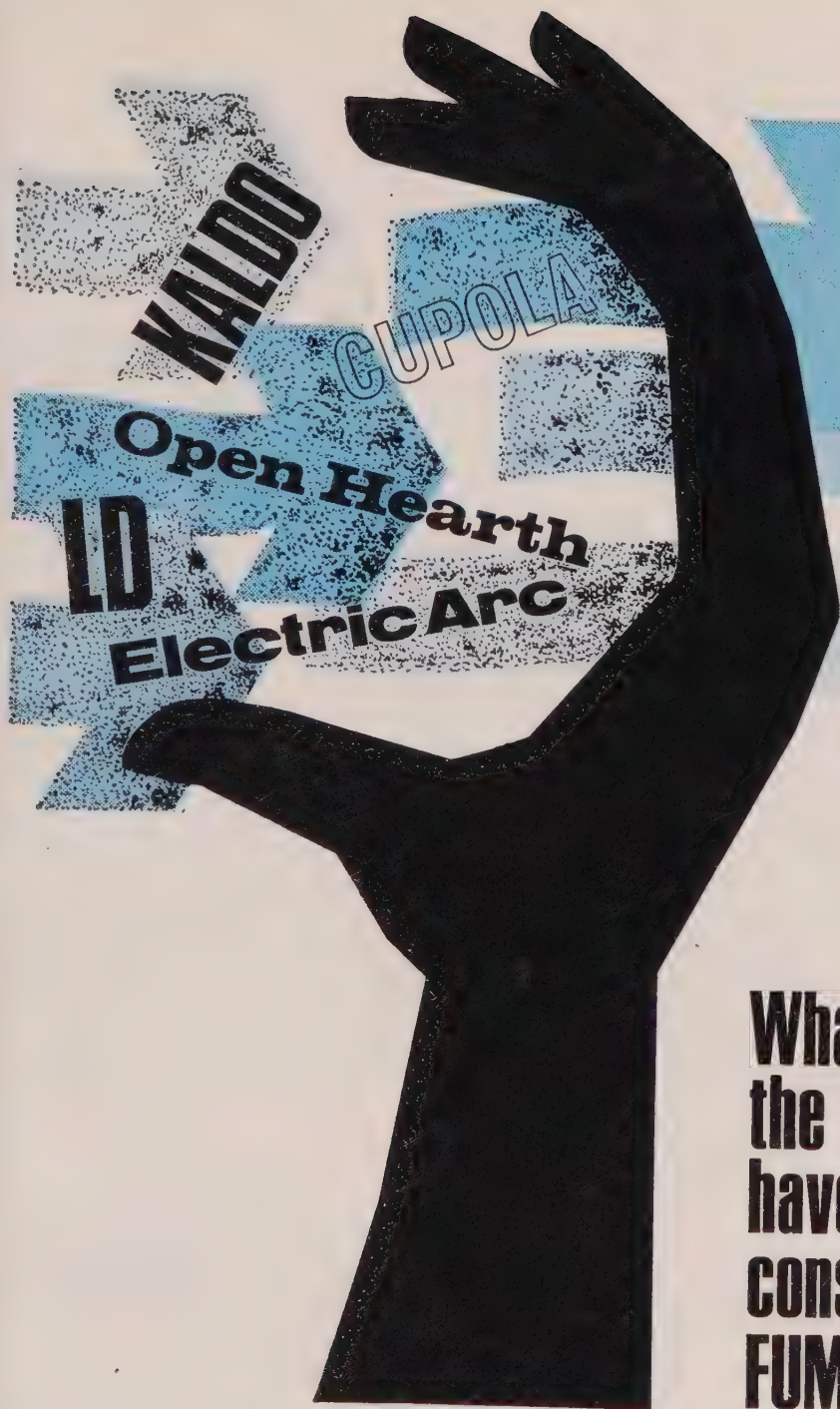
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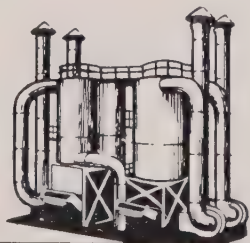
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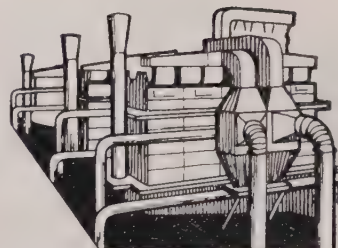
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watching pictures in the fire.*

*Her dad
(being older and more demanding) likes
a cosy room with no chilly corners,
a hot bath in a warm bathroom,
and the comfortable feel of money in
his pocket **after** he's paid the fuel bill.*



a living fire
(in a modern room heater)
keeps them both happy



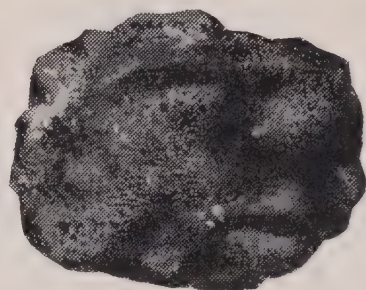
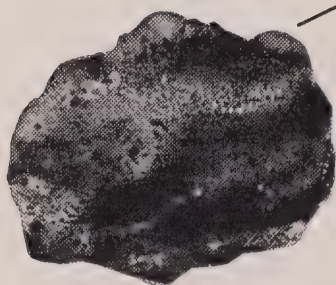
and Mrs Jones isn't doing too badly, either. Because their modern room heater does a lot more than provide a friendly glow and wall-to-wall warmth. The particular one they've got has a high-output back boiler that gives her plenty of hot water whenever she wants it. Plus room to room warmth from radiators round the house. And she has a lot less cleaning to do. Not only is the room heater itself much easier to clean but burning smokeless fuel keeps the whole room cleaner. Besides being just right for smoke control areas. So, from that cosy fire, the Joneses get everything they want for a comfortable home. They get it cheaply, too. (Remember that money in dad's pocket?)



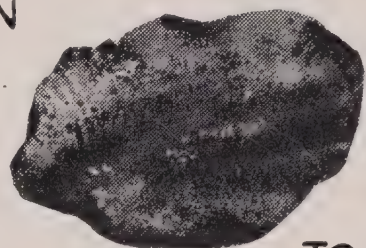
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WOULDN’T DO FOR A
PRINCESS’

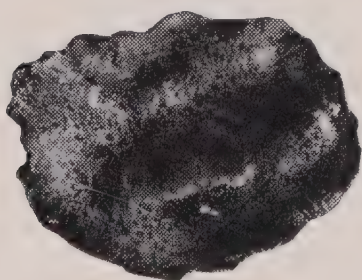


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SEALED CONVECTION
CHAMBER - SO NICE
TO KNOW YOUR
HEAT ISN'T WASTED’

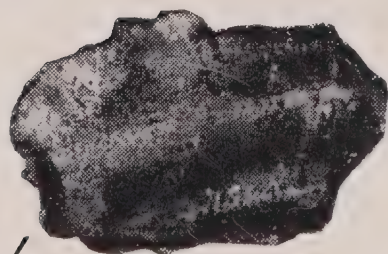


‘TRUST A
PRINCESS

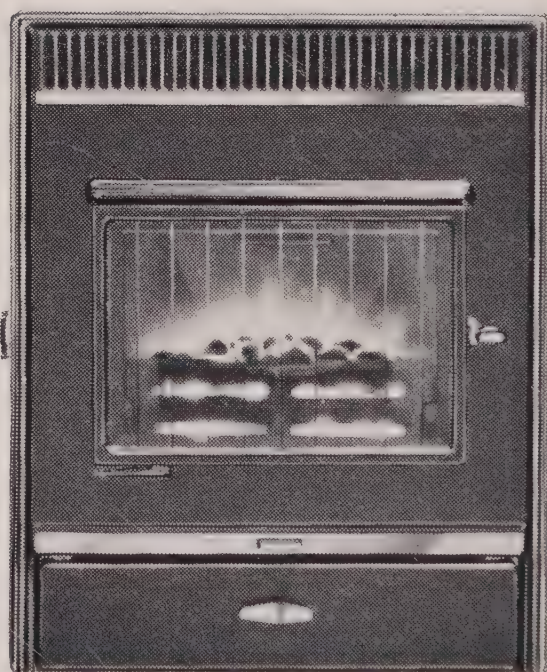
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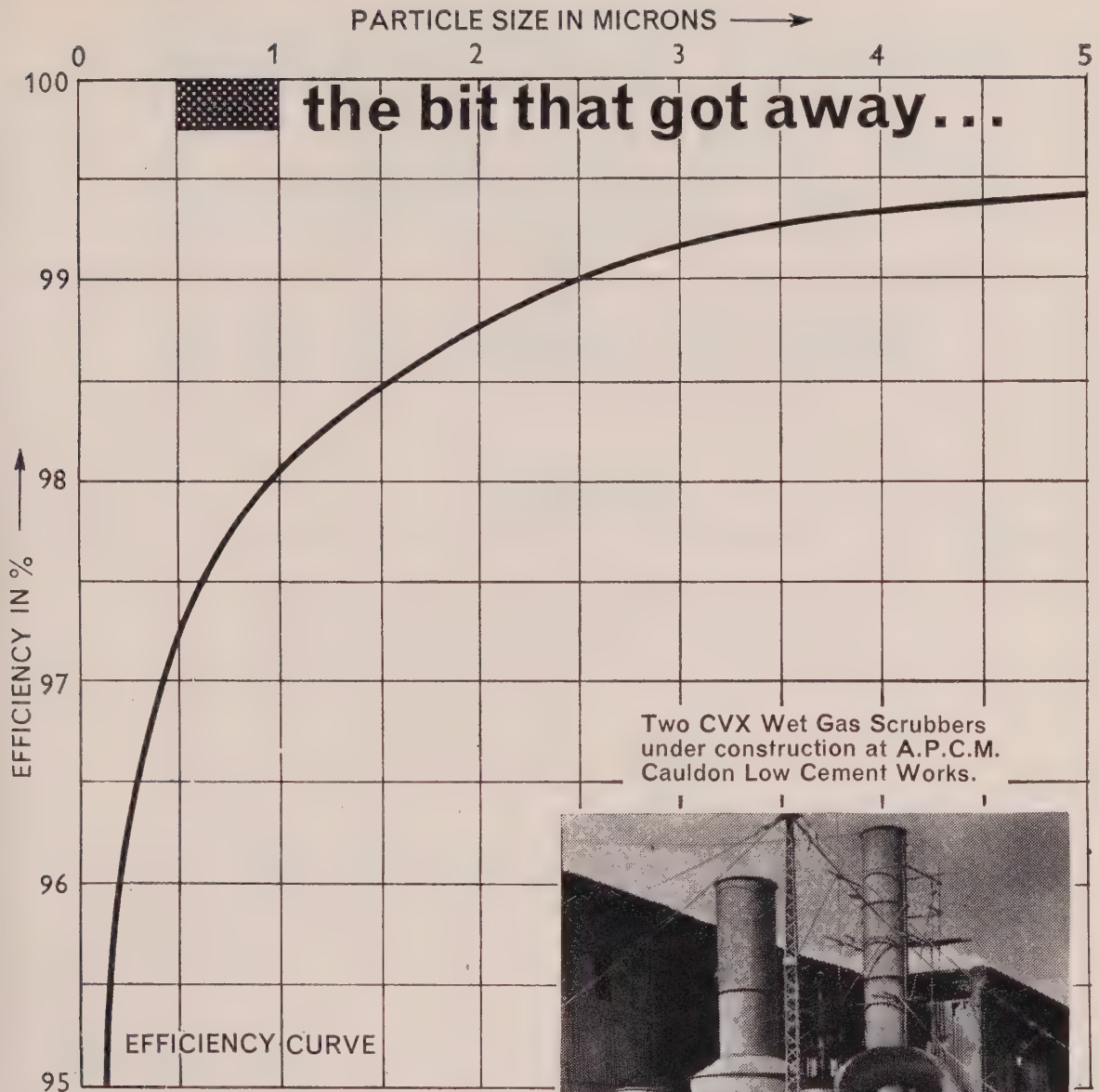
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COMES FROM A GOOD
SMOKELESS FAMILY’



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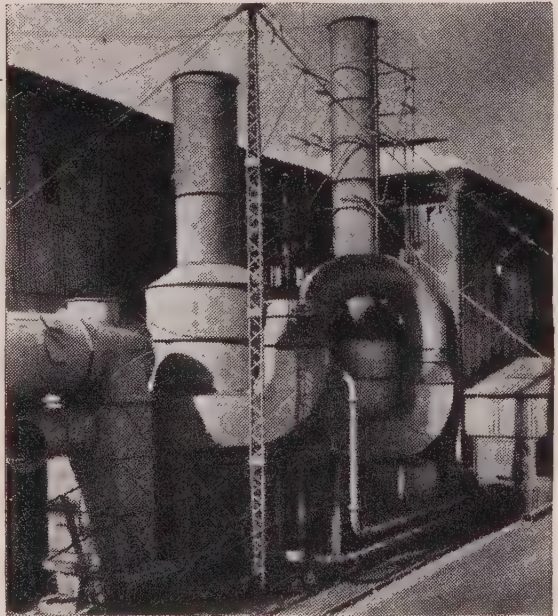


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(convince me)
(sell me)

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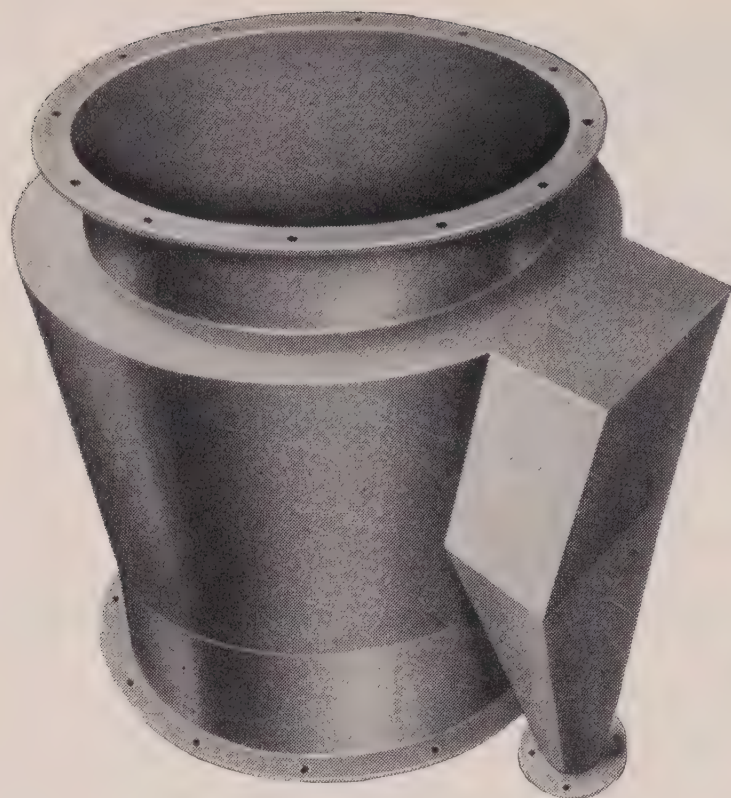
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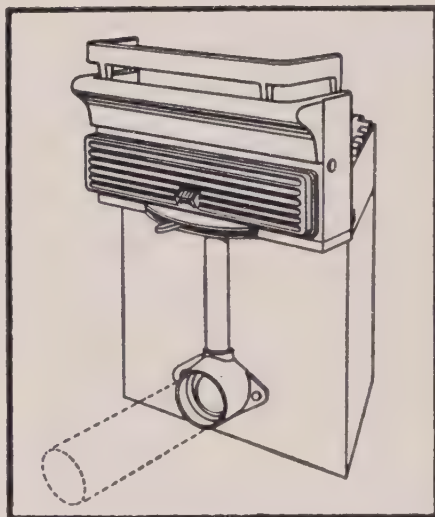
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INTERNATIONAL CLEAN AIR CONGRESS,
London, October 1966. Readers are reminded that
proposals for Papers to be presented should be
received by the Society by 31 December, 1965.

Note the date—The Society's A.G.M. and a special meeting to commemorate the 10th anniversary of the Clean Air Act, followed by the annual luncheon, at the Connaught Rooms, London, on 9 May, 1966.

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Winter 1965

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SMOKELESS AIR is published quarterly by the National Society for Clean Air at Field House, Brems Buildings, London, E.C.4. Tel.: CHAncery 5038 (Editorial and Advertising). Editor: Arnold Marsh; Asst. Editors: V. Finlay, A. A. Mister. Issued gratis to Members and Representatives of Members. Subscriptions rate for SMOKELESS AIR only, 12s. per annum, post free.

SMOKELESS AIR is the official organ of the Society, but the views expressed in contributed articles are not necessarily endorsed by the Society. Abstraction and quotation of matter are permitted, except where stated, provided that due acknowledgments, including the name and address of the Society, are made.



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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

Home Thoughts from Eastbourne

NINE of the sixteen papers at the Society's Eastbourne Conference were concerned with the problems of domestic smoke and its abolition. Since it is now recognized that the home is today the largest and most serious constituent of air pollution this is perhaps as it should be. Our interest in matters of fuel policy and in the fuel industries, reports of which take up a fair space in this issue, is largely due to our anxieties about the further and speedier progress of the clean air programme.

We were glad to hear the forthright remarks of the Parliamentary Secretary to the Ministry of Power, Mr. John Morris, M.P., in opening the conference, about the recalcitrant local authorities. (His address is recorded on a later page). These authorities, and those who made a start and have since lost heart, are a serious problem, and one hears more and more frequently the wish that the Clean Air Act had made it mandatory, instead of permissive, for local authorities in the black areas to introduce and proceed steadily with a smoke control area programme.

The four conference papers, on "new horizons" in domestic heating, from the oil, solid fuel, gas and electricity industries, were encouraging and optimistic about the future, and the two papers on the special problems of the distribution of solid smokeless fuels were valuable for showing how some of the real difficulties were being overcome. The

three "success stories" demonstrated what can be done by local authorities who possess determination and have developed the know-how needed to secure public acceptance of smoke control measures. It should be pointed out that these papers were only a small selection from among the many that could have been invited to tell of their successes, including those in the London area, where smoke control is just half way to the final target.

Perhaps another year we can try to reverse the operation by inviting papers from those authorities castigated by Mr. Morris, on "Why we haven't done a thing about smoke control"!

The Cost Factor

The main obstacle to more rapid progress on smoke control areas is undoubtedly fear of costs. All other objections and excuses for delay are on examination insubstantial or frivolous compared with this. There is first the capital cost of the conversion of appliances, which weighs heavily with some local authorities, and more particularly there is the fear that the cost of heating the home will be greater, and that therefore smoke control will be unpopular or unfair. This objection centres always on solid fuel, the price of which is compared only with the price of house coal. Real thermal costs are ignored or not understood. The dwindling away of the cheapest open fire fuel of all, gas coke, makes it more difficult to dispose of these cost fears, and the

promise of greater supplies of the premium fuels, both those already established and the new ones coming from the National Coal Board, though very welcome indeed, is clouded by the fact that they do, or will, cost more than the fuels with which—mistakenly—they are compared. The arguments against this simple comparison are many and conclusive, and the problem is how to put them over to the nervous local authorities and hence to their citizens.

Today, in our generally affluent society, the great majority of the public can well afford the small increase in what they pay for warmth, without taking into account the benefits of cleaner air. Indeed, more and more are doing so on their own account, both inside and outside the black areas. It is a strange thing that so many should pay cheerfully much more for the frivolities of life—such as gambling, drink and tobacco—and yet be so fearful about what they pay for warmth and comfort in their homes.

The OAPs

One special case of this cost difficulty came up in discussion at the conference, just as it is frequently coming up in letters from smoke control objectors in the local newspapers: the pathetic cases of hard-up old-age pensioners, shivering in their cold rooms because they cannot afford to buy smokeless fuels. The only valid aspect of this is that it is possible, by wrapping up well against the cold of the room, to get a pseudo comfort from a tiny coal fire, whereas one must have a bigger fire with a smokeless fuel. But to do the right thing for old-age pensioners and others in a similar plight, it is necessary, not to subsidize their fuel supplies (or other individual items of expenditure) but to provide them with pensions that are adequate for living according to the standards of reasonable comfort that are expected and enjoyed by the rest of the community, among which warmth is one of the most basic needs.

The International Congress

At the time of writing the results are just coming in of the first publicity about the congress to be held in London in October, 1966. It is yet too early to be definite, but there are promising signs of interest in many countries throughout the world, and of course in the U.K. itself. Invitations to propose papers have been sent out widely, and at the same time the Society is actively promoting the Clean Air Exhibition to be held in conjunction with the congress. As most readers will know, this is to be held in the New Horticultural Hall, with the congress meetings in the Old Hall, Vincent Square, Westminster, adjoining. Although it is again too early to be sure, we are hoping that there will be a good proportion of overseas exhibitors, including national stands, from countries that are particularly concerned with air pollution prevention, either on a governmental level or by the joint effort of manufacturers, research bodies, and so on—similar to the successful British Stand at the Düsseldorf exhibition earlier this year. Air pollution knows no frontiers, nor should the means and knowledge to combat it.

Bonfires

This note is being written on the eve of Guy Fawkes Day, when the air of Britain will be filled with the smoke from a million (at a guess) bonfires. The fire, and the fireworks, hazards are outside our province, and we have no firm evidence that this annual eruption of wood smoke does anyone any real harm. Combined with cold and damp, as is often the case on 5 November, it may, however, be unpleasant for bronchitics and asthmatics. Like Christmas feasting, and the annual carnivals some other countries still enjoy, it may prove to be psychologically useful, as Britain becomes smokeless, to tolerate a once-yearly orgy of smoke-making.

More seriously, there is the question of nuisance of more frequent nuisance

from garden bonfires, to which, as reported on another page, the Association of Municipal Corporations has been giving attention. Here we have an age-old method of disposing of garden refuse—sometimes dry and woody and making little smoke, and sometimes green and wet, emitting much smoke over lengthy periods. Fortunately the growth of composting must be doing much to reduce the numbers of burnings. This is a form of smoke emission not intended to be covered by the Clean Air Act, and subject to control only as a common law nuisance or through any local byelaw that exists and is remembered as existing. Normally, garden bonfires are too infrequent and too thin on the ground to make any serious contribution to the general level of pollution. The smoke may contain harmful constituents but these are unlikely to be in harmful concentration for any significant period of time. The smoke is of course mostly water vapour.

Nevertheless, as we know from complaints we receive, frequent bonfires or fires lit without due thought of neighbours, can cause considerable and even obsessional annoyance. The problem is largely one of good neighbourly manners. We have, for instance, just had a letter from a writer who complains that while he has had one bonfire in two years, his neighbour has had 17 in one month! Clearly some form of restriction is desirable in such cases, even though the bonfire that is made with due regard to others is left alone.

The third type of bonfire that must be condemned without qualification is the autumn rite of burning—or rather slowly smouldering—large heaps of leaves (valuable compost material!) in parks and other public places. This is as nasty as it is unnecessary.

The Clean Air Council

The Clean Air Council, the advisory body under the chairmanship of the Ministry of Housing and Local

Government, set up under the Clean Air Act, 1956, has recently made a number of new appointments. The Society is represented by the appointment of its Director and the Hon. Secretary of the South-east Division. Also of much interest is the appointment of a member from the Press. The new, and some renewed, appointments (to April, 1968) are: Councillor K. L. Bates (Chairman, Billingham U.D.C.); Commander Colin C. Buist, M.C.V., R.N. (Retd.), (Chairman, Low Temperature Coal Distillers Association); Harold Evans (Editor, Northern Echo); T. R. Grieve, M.C., (Shell Mex and B.P. Ltd.); R. A. Hacking, O.B.E. (late Director of Research, Richard Thomas and Baldwin Ltd.); J. S. Hodgins (Chief Public Health Inspector, London Borough of Hillingdon and Hon. Secretary, S.E. Division, National Society for Clean Air); Arnold Marsh, O.B.E. (Director National Society for Clean Air); Dr. G. Nonhebel, M.A., (Fuel Technologist, late of I.C.I.); Alderman Mrs. P. Sheard, J.P., (Sheffield C.B.C.); J. T. Turner, (Chairman, Vehicles Committee, National Road Transport Federation).

Polluticians

A member who is an Air Pollution Control officer for an important industrial firm tells us that recently, when being asked to describe his post for the filling-in of a form, he said in a moment of inspiration, "Pollutician". He suggests that it is a long time since a new word, namely, smog, was coined by those concerned with air pollution—we mean polluticians—and this might be adopted by the movement. We rather like it, and are looking forward for opportunities of using it when describing our job. Our correspondent goes further, and feels that before long the duly qualified practitioner may be recognized as a Chartered Pollutician (C.P.) or Registered Pollutician (R.P.). Perhaps there may even be a Trade Union, enjoying the distinctive and expressive initials of N.U.R.P.

The Opening Address

by

John Morris, M.P.

Parliamentary Secretary, Ministry of Power

MR. President, Madam Mayor, Ladies and Gentlemen. First I must apologise on behalf of my colleague, Mr. Bob Mellish, the Parliamentary Secretary to the Ministry of Housing and Local Government. I spoke to him last Friday and he wanted me earnestly to convey on his behalf his apologies for not being able to be with you this morning. One of those strange things is that sometimes Ministers are called to book in the House of Commons, and every few weeks your turn comes up for question time, and today happens to be the day that the Ministry of Housing are very high in the order of batting in the House of Commons, so that it is vital for Mr. Mellish to be there. He obviously would have been the best person on behalf of Her Majesty's Government to address this Conference because we all know the important part that the Ministry of Housing plays as far as clean air is concerned.

I share with him some responsibility because, as your President indicated, one is for it and the other is the cause of it. He and his Minister have the great task of assisting and guiding local authorities in the designation of smoke control areas, and our job at the Ministry of Power is to ensure that there are at all times adequate supplies of smokeless fuel available, so that they can get on with their job. If we do not do our part, if we do not assure the suppliers, then the battle is lost in the first stage. It is a pleasure for me to be here, as the first member of Her Majesty's present Government to speak to you, and to try on behalf of

Mr. Mellish to put before you some of the points that he would have put, had he been here.

I would like on behalf of the Government to extend to you, as a Society, our deep appreciation of the enormous voluntary work that has been done by you over the years. I was reading before I came down, of the beginnings of this Society, the pioneering effort that has been made, your great task above all else of conditioning public opinion—and unless in a democratic country like ours we are able to condition and carry public opinion, there is not a great deal that you can achieve. I think it is an enormous tribute to the great work, the great life of this Society, that it has been able to condition and to educate public opinion, so that we have been able to achieve the minor successes that have been achieved hitherto; and it is my pleasure on behalf of the Government to extend to you our most sincere congratulations and thanks for the driving force over the years.

Secondly, Mr. President, I would like to make it clear—if it is necessary to make it clear—to everyone, to local authorities, to industry, to the general public, that the Government is determined to see that air pollution of all kinds is reduced to the fullest possible extent that is economically and practically possible. On this issue let there be no doubt that we want to stand up and be counted. We are definitely on the side of extending and improving the air of this country. I would like to go through the stages, looking first at the industrial side and the measure of



Mr. Morris addressing the conference

achievement there, and then going on the domestic side, and try to evaluate how far have we got, and how far can we go in the immediate future. In this kind of field progress is slow, occasionally hardly perceptible. Some of us would like to go very much faster and it is important for us to be realists and try to face up the measure of achievement that we have attained.

One of the things I am trying to do in my very minor office in Government, so far as my advisers are concerned, so far as my colleagues are concerned, so far as my opponents are concerned and above all else so far as I myself am concerned, is to try and face the reality of each situation. On the industrial side, as we all know, there has been close co-operation between the Government as represented by the Alkali Inspectorate, and industry, and of course there are many problems still unsolved in this field. As regards the details, I do not wish to trespass on the field of the address of Mr. Ireland to you later this week. But I think that with this part of the battle we are fully entitled to blow our trumpets on all sides, for the great achievements that have been made by British industry in ensuring that we have better air. I think that this

co-operation between the Inspectorate and industry is unique, and that it has resulted in standards in industry which are the highest in the world. We sometimes tend to denigrate British achievements, but in this field I am advised that they are the highest in the world and improving steadily year by year.

I doubt, Mr. President, whether the industry of any other country does so much of its own accord, and out of its own pocket, to reduce air pollution. Among our problems, there is that of grit and dust, and here local authorities and those responsible need guidance, need standards. On the advice of the Clean Air Council a working party was set up and as a result of its investigations one hopes there will be guidance, and satisfactory guidance, issued fairly shortly. Likewise so far as premises for which local authorities are responsible, there has been of course immense co-operation, and there has been a two-way traffic of the Inspectorate and local authorities, each one assisting and drawing from each other's experience and assets. I think it is obvious to all of us that since the Clean Air Act came into force, industrial smoke has been substantially reduced, and that at a time when there has been an increase

in productivity in this country, an increase in growth and a resulting increase in demand in fuel consumption.

The Domestic Side

Let me turn now for the moment, Mr. President, to the domestic side and to examine once again, in the nine years that have gone by since the Clean Air Act came into force, the measure of our achievement. First, let us be frank: there is no hope of fulfilling the timetable of the Beaver Committee. Reporting as it did in 1954, it suggested that within ten to fifteen years every dwelling in the black areas would be able to burn smokeless fuel, and it came to that conclusion on certain policies and certain assumptions, but such have been the enormous changes in that time that some of those assumptions are no longer true. They thought first that gas coke would meet the demand for open fire smokeless fuels. There have of course been immense technological changes in the gas industry and it is obvious to all of us that production of gas coke over the years will go down. Then there was the assumption that the average cost of conversion would be about £10; and thirdly there was the assumption that every local authority in a black area and the public generally would gradually accept the need for a smoke control area.

These were the assumptions, and the first two certainly no longer hold good. There have been great changes in the gas industry, and the cost of conversion has trebled since the Act came into force. Adjustments have therefore had to be made to the Clean Air grant arrangements to ensure that use was made of all available smokeless fuels without concentrating on any one particular type, and so far as solid fuel supplies are concerned I am delighted to repeat what I said to the Clean Air Council in January, and my statement then was issued as a White Paper to local authorities and other interested parties. I repeat that so far as the supply of solid smokeless fuels is concerned things have got a lot

better since the 1963 White Paper. The Coal Board and the private producers have between them stepped up their plans so that if the demand is there, $1\frac{1}{2}$ million tons of open fire smokeless fuels will be made available over and above the amount estimated in 1963. I am sure you will all agree with me that this is worthwhile progress, and I understand that the Coal Board hopes to market its new fuels this winter, and very excellent fuels they are.

That is the situation so far as supplies are concerned. Supplies are adequate, although there may be some difficulties in some areas and some people may have to burn premium fuel whereas they might have preferred to burn cheaper fuels, and this has necessitated in some areas to change the grant arrangements. I am confident that the grant arrangements meet the new situation and that the problem of solid fuel supplies is being solved. So, therefore, on these facts, so far as my Minister's responsibility is concerned, with respect to the supply of smokeless fuels, there is nothing to stop local authorities in the black areas from going ahead with a regular programme on smoke control orders. We have done our job, and are doing our job, and the producers are doing their job, and again I am very glad to be able to say that all the major cities seem determined to complete their smoke control programmes as soon as they can. One has only to look at the progress in London, Manchester, Sheffield, to name only three. The progress there is clearly visible, especially on a misty day like this. What a situation it would have been in London this morning had there not been the progress of the last nine years. I might not have been here with you this morning! Some of the smaller black area authorities are already ahead of, or at any rate keeping pace with the leaders.

The Laggards

However, it is obvious and I think we should face it, and you as a Society, if I may use the phrase, a

Society of missionaries and of pioneers in this field, will be horrified to know—and know in fact, as well as I do—that some local authorities are seriously lagging behind, especially in the very black areas which we want to tackle above all else. I regret to say that about 27 per cent—this is a staggering figure—of all black area local authorities have either not begun to make smoke control orders or have up-to-date covered less than 1,000 premises by smoke control orders. There is an immense task in front of these people. Whatever their reasons may be, and some of them will probably be understandable even if they are not acceptable to us, I don't think and I am sure none of you will think, that this country can afford to let them lag behind any longer. We all suffer together when the air is polluted; we cannot isolate ourselves from the effects of foul air and we all benefit together from clean air. We know that we cannot yet get rid of or avoid all pollutants, but we can get rid of one of the major enemies, smoke, and it is the duty of every local authority in the black area to do so. I earnestly hope, and so does my colleague in the Ministry of Housing and Local Government, that 'the comparatively few non-starters will now take up the running and even though there is at present no statutory duty laid on local authorities to exercise their powers there is no doubt, in the interests of their own people and to meet amenities, they ought to exercise them.

So far I have dealt only with industrial emissions and smoke, and some of you will question what is the progress in the other fields, and what about sulphur dioxide? Here it is my privilege to congratulate the Society on the invaluable study of their Technical Committee. The Government agrees with their broad conclusions even though the problem of sulphur dioxide is at present insoluble in economic terms. We should do all that is economically possible to reduce total emissions and to reduce its concentration in the air that we breathe. Here perhaps it would be

useful to clear any misunderstandings that there may be, and to say that the latest medical advice and research suggests that sulphur dioxide by itself, in the concentration usually found in our cities is not harmful to health, though it may have harmful effects in association with other pollutants. It is important to bear this in mind so that we can get our priorities right. Sulphur dioxide is a major and a most undesirable pollutant with obvious undesirable effects on buildings, and we must do our best to reduce it, though it alone does not appear to be the major health hazard as some would have us believe.

Motor Vehicles

Now if I may turn very briefly to the subject which the Mayor raised in the course of her Address; the question of motor vehicles. They, like the poor are always with us. We cannot avoid the motor vehicle. It is here in every street, in every town, and every community; it is the great indispensable of our age. Its exhaust is a matter which has caused great concern to all of us for years, and here too I would like to clear up some misconceptions. First, it has been alleged that the motor vehicle may be guilty for the lives lost through lung cancer. The Ministry of Health and the Medical Research Council tell us that although the exhaust products of petrol engines and maladjusted diesel engines do sometimes contribute small amount of carcinogenic hydrocarbons, the concentrations are minute compared with those found in coal smoke and that there is no evidence as yet to suggest that motor exhausts causes cancer. My friend Mr. Mellish has recently been studying this difficult problem of pollution from vehicle exhausts with his colleague, Mr. Stephen Swingle, the Parliamentary Secretary at the Ministry of Transport, and they have come to the conclusion, on the best possible advice available to them, that while diesel smoke is a major nuisance and possibly a possible traffic hazard it is not injurious to health. On the other hand, carbon



Opening the Exhibition—Mr. Morris with (left to right) the Mayor, the President, Mr. Stanley Cohen, and Mr. Arnold Marsh

monoxide, which is not an obvious nuisance, may affect drivers' efficiency in certain circumstances, as we all know.

What my colleague at the Ministry of Transport has done is to ask Sir Patrick Hennessy, the President of the Society of Motor Manufacturers and Traders, if they will concentrate their efforts on seeking ways of reducing to the minimum possible extent the emission of carbon monoxide from the petrol engine. I am pleased to say that he has just received an encouraging reply which emphasizes that the industry's research in this field is on an active and increasing scale and is being treated as you will all be pleased to know as a matter of urgency. But I think that it would be foolish to pretend that there is likely to be any single easy solution to the problem: the major line of attack must be on the source of the pollution, the engine itself. While it is necessary to concentrate on the urgent fields of research as I have outlined, we must not forget

the importance of other policies in other fields which add up to the sum total of improving the general position. The building and constructing of by-passes and highways, the reduction of traffic in urban centres, sound town planning—all these help to move traffic more quickly, and at the end of the day all this must be beneficial to our general health. Then so far as the diesel engine is concerned, no doubt all of us have cursed the oily black smoke from a badly overloaded, badly maintained diesel truck which may have been travelling up a hill in front of us. We have said that something must be done about this and how terrible the emissions are, and what a nuisance it is creating. Of course, and in fairness to our engineers and manufacturers, and to the bulk of transport drivers and those whose duties it is to maintain these trucks, if they are properly maintained, properly driven and properly loaded, diesel vehicles do not emit smoke, but the Ministry of Transport are determined

that operators should be made to realize that diesel smoke will not be tolerated, and the Ministry of Transport are therefore continuing and intensifying their policy of road checks and is arranging for all diesel engined heavy goods vehicles to be regularly checked for smoke in the special testing stations which are to be set up for goods vehicles. Fixing power and the rate ratio for goods vehicles is another thing planned. This will help because overworked diesel engines, which, as we all know from our sad experience, are particularly prone to smoke. I am sure that operators, those responsible for running fleets of diesel engined vehicles, or even one vehicle, will find that it pays them to treat their vehicles properly rather than to have them taken off the road in the middle of their journeys, loads and all. I think that this is an indication of the seriousness and the sense of urgency that the Ministry of Transport have about this problem. They are intent on tackling it and will take the measures that I have outlined.

I think all I have said is an indication that so far as the many individual problems of clean air are concerned, each of the Ministries concerned is doing what it can to tackle its own particular problems. The Ministry of Health are looking, as I have indicated, at each of the health aspects, the Ministry of Housing and Local Government are determined, in the very strong terms that I have set out, to ensure that those local authorities in the 'black areas which are lagging behind must soon take decisive steps, because the country cannot tolerate the existence of unclean air as it is now in those parts. So far as the Ministry of Transport are concerned this sense of urgency is apparent in the steps that they have already indicated; and we in the Ministry of Power are pleased to say that so far as the supply of smokeless fuels are concerned, they are available, and that the local authorities certainly cannot blame supplies for the necessary extensions which are needed in this field.

Public Opinion

In conclusion, let me say this, Mr. President, that at the end of the day clean air depends, as we all know, and as this Society particularly knows, on the strength and force of public opinion. I believe and this is in part a tribute, as I said earlier, to the great and pioneering work of this Society: I believe that the public generally is at last beginning to realize that clean air is as necessary and as vital to the good health of our citizens as clean water. We have spent enormous amounts of money, enormous amount of time and energy, in providing clean water for the people, and I am glad that there has been success, so far, since the passing of the Clean Air Act in also providing clean air for our people. It is obvious to all of us that air pollution is a social evil which can and must be overcome. Your Society has done more than any other body to bring the public to this realization. Again let me on behalf of the Government thank you. We all owe you a debt of gratitude for your untiring efforts going back for many many years in the cause of clean air. Thank you for allowing me to speak here this morning. I am delighted to be with you, and I am delighted to be with you for the rest of the morning.

New Rexco Plant

Lord Robens, Chairman of the National Coal Board, opened a new Rexco smokeless fuel plant for the National Carbonising Company Ltd., at New Ollerton, Notts., near to Ollerton Colliery, on 4 November.

Production at the new plant will provide another 200,000 tons of Rexco smokeless fuel for distribution in the Home Counties, East Anglia and South Lancashire. For the first time, Rexco will also be made available this winter to coal merchants in the West Midlands.

The opening of the Ollerton plant brings the number of Rexco production units up to four. There are others at Marsfield and Edwinstowe in Nottinghamshire and at Comrie near Dunfermline, Scotland.



The President, at the opening session (at right)

The Eastbourne Conference

The Society's conference at Eastbourne at the end of October was helped by warm and sunny weather, a full programme of excellent papers, lively discussions, delightful hospitality from the Eastbourne Corporation (and much assistance behind the scenes) and the privilege of meeting in one of the best congress halls in the country. The sum total was a conference declared by many to have been one of the most successful ever.

To take a few highlights in chronological order: the informal get-together on the Monday evening was crowded with delegates, all happy to meet old friends again. This is one of the best, and certainly the friendliest, features of the conference. The opening proper on the Tuesday morning made a flying start with a delightful civic welcome from the Mayor, Councillor Mrs. Underhay, J.P. In a pink coat and dress, and wearing a matching pink tricorne hat (which seemed to embody the essence of mayoralty) the Mayor charmed all her listeners, and her elegant town could not have chosen a more fitting and representative first citizen.

She was followed, not by Mr Mellish, the Parliamentary Secretary of the Ministry of Housing and Local Government as stated in the programme, but by Mr. John Morris, Parliamentary Secretary to the Ministry of Power. Parliamentary duties had prevented Mr. Mellish from coming, and it was generous of Mr. Morris to take his place at the last moment. His address, which can be read in full elsewhere in this issue, was outstanding and helpful in every way to the clean air movement. The appreciation he expressed of the Society and its efforts was most gratifying. The final part of the opening session was the Presidential Address by Sir Alan Wilson, which was notable for its clear and cogent analysis of the air pollution problem as we find it today.

From Tuesday afternoon until Friday morning the conference had presented sixteen papers covering many aspects of the air pollution problem. To pick out any for special mention would be invidious: all accomplished with success what they had set out to do. Members who did



The Mayor, Councillor Mrs. K. J. Underhay, J.P., welcomes the conference to Eastbourne



At the informal "get-together" on the eve of the conference

not attend the conference may like to know that the preprints of the papers filled a 155 page volume, and that it contains about 80 illustrations (including, for the first time, two in full colour). The preprints broke most records for size and variety (and incidentally cost of printing!)*

The outstanding social event for all delegates was the Civic Concert on the Thursday evening, when they were the guests of the Mayor. This was a first-class and most enjoyable event, with some excellent singing, piano music, two clever people with xylophones, and a great little compere whose between-turns stories were first-class turns in themselves. During the interval the Mayor presented the S.S.F.F. golf challenge cup to this year's winner, Mr. W. Gilchrist, of Batley. The golf tournament attracts only a small number of delegates—20 entries this year—but it would be a brave man who dare suggest it should not continue!

Visits included one to the new Dungeness nuclear power station, one to a Reed Paper Mill, and one to a cement works. For the ladies there were trips to the Pestalozzi childrens' village and to Batemans, the home of Rudyard Kipling. They were enjoyed by all who participated, and other delegates had an afternoon off.

The Exhibition, in the Winter Garden adjoining the Congress Theatre was by many (including exhibitors) said to be the best the Society had yet staged. It was certainly attractive and stylish, and some of the stands were models of first-class display design. Linked with the Exhibition was a poster competition for children (with 400 entries), followed by a competition for visitors to the exhibition, who had to match their judgment of the posters against that



Sir John Charrington opening the Tuesday afternoon discussion

of the official judges. These were the Mayor herself, Miss Mary George, Chairman of the Society's Publicity Committee, Mr. G. Flint, Principal of the Eastbourne School of Art and Mr. Edward Edlington. The arrangements for the competition involved a great deal of hard work, and were in the hands of Mr. Edlington, the C.P.H.I. for Eastbourne, and his staff, to whom special thanks are due. It is difficult to thank individually all who contributed to the success of the conference and exhibition, but all they did is warmly appreciated.

E.D.A. to End

The Electricity Council is to take over the services at present provided in England and Wales by the British Electrical Development Association (E.D.A.). The Association with all their staff will be constituted as a new division of the Electricity Council under the present Director. It is expected that the change will take place later this year.

* A few copies of the preprints are available at 15s. The final volume of *Proceedings*, including the other address and the discussions, should be ready early next year, and will cost 30s. to non-delegates.

Presidential Address

by

Sir Alan Wilson, F.R.S.

BEFORE commencing my address, I would like to say how much I appreciate the honour of serving as President of this Society, which has done and continues to do so much service to the community by bringing the facts of air pollution to the attention of the public. The improved standard of living which we all enjoy is due to the increasing industrialization of the country, and industrial processes are accompanied by noise and by dirt. These nuisances were once accepted as necessary evils, but this is no longer so, and there are very strong reasons why we should spend a proportion of our wealth on increasing our amenities. We cannot, of course, abolish noise and dirt altogether; to do so would be prohibitively costly. Fortunately much can be achieved in the reduction of air pollution by measures which show an economic gain by producing more heat with less expenditure of fuel, and we must use all our endeavours to increase the speed with which these measures are being adopted.

In Appendix III of the 1954 Report of the Committee on Air Pollution (the Beaver Report), it is stated that "a large volume of technical knowledge is already available about the nature and sources of air pollution, its effects and methods of prevention". But the Report goes on to list twelve important aspects of air pollution on which further research or development work is required. When the Clean Air Council was set up in 1956 under the Clean Air Act, one of its first tasks was to make a more detailed survey of these research and development problems, in conjunction with the Department of Scientific and Industrial Research and the Medical

Research Council. As a result of these deliberations, a closer integration was achieved of the work being carried out in the field of air pollution. The primary responsibility for co-ordinating the existing work, and for seeing that new work was started, was assigned to the Fuel Research Station, Greenwich, the Director of which was my predecessor in office, Dr. Albert Parker. When the Fuel Research Station was closed down at the end of 1958, responsibility for the work on atmospheric pollution was transferred to the new Warren Spring Laboratory at Stevenage.

One of the tasks which was given a very high priority by the Research Committee of the Clean Air Council was the systematic recording of air pollution in a large number of localities throughout the country. It was felt that, since there are so many factors which might affect air pollution, it would be extremely difficult to determine the efficacy of the preventive measures which were about to be taken, unless detailed records were kept, which could be analysed. The Warren Spring Laboratory has recently published a comprehensive survey entitled "The Investigation of Atmospheric Pollution 1958—1963", and as I was one of the original members of the Research Committee, it is appropriate that I should review the findings of the Laboratory.

National Surveys of Pollution

When the Beaver Report was written, a certain amount of data regarding pollution was available, based partly on the trends in fuel consumption and partly on surveys carried out by 160 local authorities and other bodies. Some 1350 instru-

TABLE I
Consumption of fuels in G.B. from 1952 to 1962 in millions of tons

	1952	1957	1962
<i>Coal</i> —Domestic	37	36	33
—Industrial and railways	79	70	49
—Others	88	103.5	106
<i>Coke</i>	28	28.5	25
<i>Oil</i>	7	12.5	31

TABLE II
Smoke produced in G.B. from 1952 to 1962 in thousands of tons

	1952	1954	1956	1958	1960	1962
Domestic	1290	1340	1310	1270	1210	1160
Railway	280	260	240	210	180	120
Industrial	780	790	750	520	350	220
TOTAL	2350	2390	2300	2000	1740	1500

TABLE III
Emission of sulphur dioxide in G.B. from 1952 to 1962 in thousands of tons

	1952	1954	1956	1958	1960	1962
Coal	4270	4430	4440	4400	4270	4240
Coke	380	400	380	340	330	330
Oil	260	350	490	740	1230	1460
TOTAL	4910	5180	5310	5480	5830	6030

TABLE IV
Consumption of domestic coal, and emission of smoke and sulphur dioxide in the London region from 1952 to 1962 in thousands of tons

	1952	1954	1956	1958	1960	1962
Domestic coal	3600	3640	3230	2400	1880	1450
Smoke	141	150	135	100	75	57
Sulphur dioxide						
coal	223	258	251	227	225	224
coke	8	13	11	15	10	8
oil	3	16	31	44	128	186
TOTAL	234	287	293	286	363	418

ments were in use, but measurements were made mainly on a monthly basis and relatively few were made daily. Since pollution depends upon the balance between the amount of noxious matter produced in a locality and that dispersed harmlessly into the upper atmosphere, the trends in fuel consumption can only give a rough overall estimate of the extent of the pollution problem. Nevertheless, the changing pattern of fuel consumption provides some interesting background information. The figures given in Table I are divided into five categories, namely those relating to (1) coal for domestic heating, (2) coal for industrial and railway purposes, (3) coal for other uses, mainly electricity generation, coke ovens and gas works, (4) coke and (5) oil. This sub-division is relevant because, in modern conditions, smoke is emitted in insignificant amounts except when coal is burned inefficiently. To estimate the amount of smoke produced it is necessary to assume certain factors, based upon a limited number of tests, for the inefficient burning of coal in categories (1) and (2) above. These smoke factors are: 3.5 per cent for domestic coal, 2 per cent for railway engine coal, while for industrial smoke the factor has steadily dropped from 1.2 per cent in 1956 to 0.5 per cent in 1962. On these assumptions, the figures for the total smoke produced are shown in Table II, and it is clear that, although the total pollution has been considerably reduced, the diminution in domestic smoke has been disappointingly low.

The second main atmospheric pollutant to be considered is sulphur dioxide. In general, the crude oil which is imported into this country has a high sulphur content, and, though most oil products have low sulphur contents, the total amount of sulphur is not reduced by splitting the crude oil into fractions. It is merely concentrated in the heavier products, particularly oil used for steam raising in large industrial plants and in electricity generating stations. The increasing use of oil therefore means

an increasing emission of sulphur dioxide, and this is borne out by the figures in Table III.

It is interesting to compare the figures given above, relating to the whole country, with the corresponding figures for the London region, which are given in Table IV. It will be seen that smoke has been reduced in London by about 60 per cent in 10 years, which is much better than the national average of only 35 per cent. On the other hand sulphur dioxide has increased in the London region by about 80 per cent as compared with slightly less than 25 per cent in the country as a whole.

While the figures for the emission of pollutants are interesting in themselves, measurements of the concentrations of smoke and sulphur dioxide at ground level are much more informative. Information of this type is, fortunately, more readily available now than when the Beaver Report was written, since there are at present some 3700 measuring instruments in use, operated by more than 600 bodies. Some results showing the difference between London and the rest of the country are shown in Fig. 1.

It is apparent from these diagrams that London is now much less smoky than other large towns, but more polluted with sulphur dioxide. The first of these deductions is a consequence of the fact that coal is ceasing to be the fuel of choice in London, whereas in other parts of the country the use of coal for domestic purposes has more or less remained constant. A further inference which can be made from the diagrams and from a study of the individual measurements on which they are based, is that the concentration of smoke at ground level depends very little on the size of the town. The major factor in removing smoke from its point of origin is dispersion upwards by atmospheric turbulence and not by horizontal drift near ground level due to the wind. Since the main cause of smoke is domestic coal, there is a strong correlation between the pollution at ground level and the amount

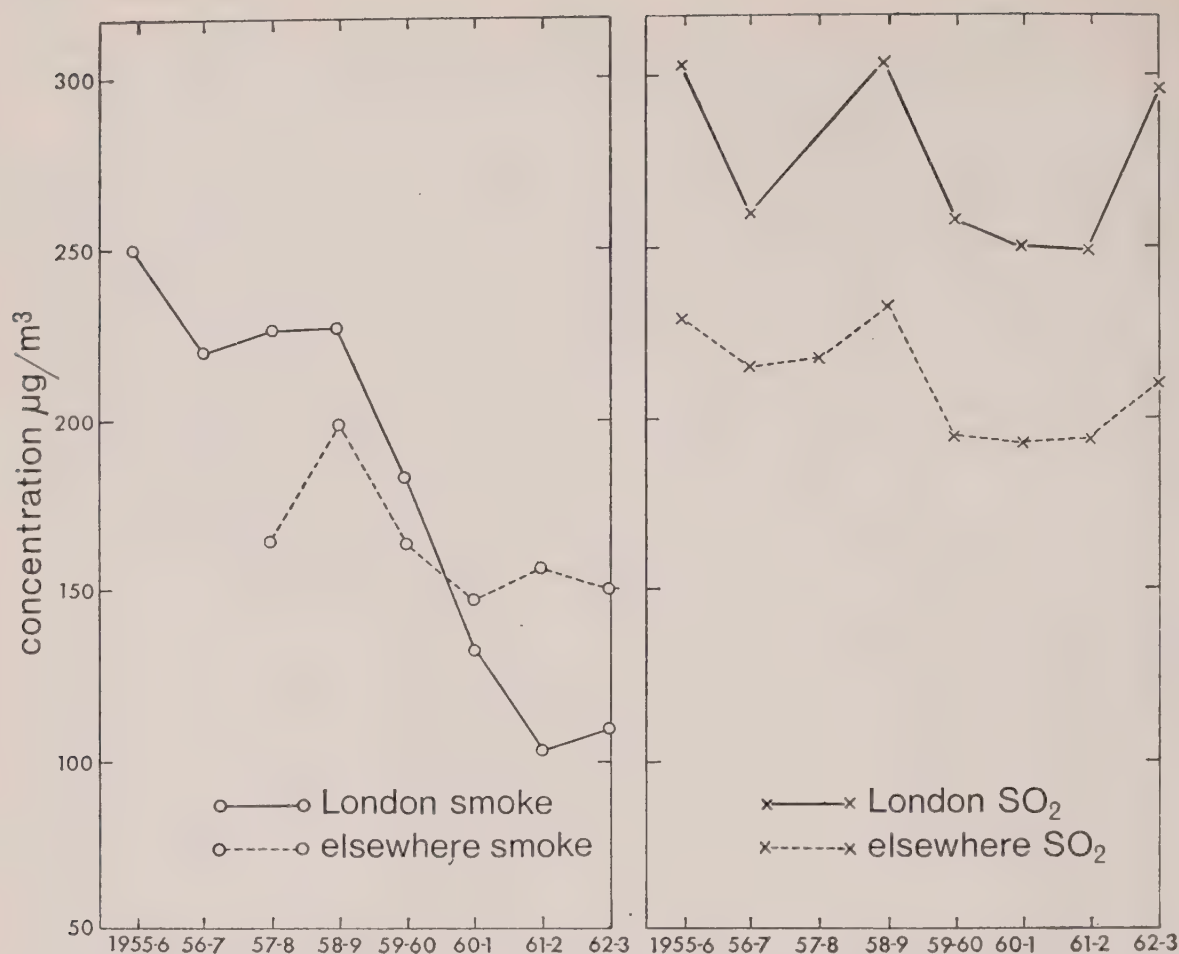


Fig. 1 Comparison of trends in London with those in the remainder of the country

of domestic coal burned in the area. This is shown in Fig. 2 which demonstrates the relation between the ground level concentration of smoke and the coal consumption per unit area in London and in Yorkshire. The greater pollution in many of the Yorkshire sites is clearly due to the larger coal consumption in those areas.

I would now like to analyse in somewhat more detail what has been happening in the last seven years, and to do this it is necessary to consider smoke and sulphur dioxide separately.

The effect of smoke control areas

The main factors affecting the reduction of smoke are the prohibition of the emission of dark smoke, and the introduction of smoke control areas by orders issued by local authorities. Dark smoke is no longer a problem, while between 1958 and 1963, "smokeless" areas have increased

from 3,300 acres to about 280,000 acres. Although this is a substantial acreage, it leaves much of the so-called "black areas" practically untouched. In fact only about 20 per cent of all the premises in the black areas are in smokeless zones, and, as the findings which I discuss below show, this is too small a proportion to have a major effect.

It is impossible to state categorically how effective the introduction of smoke control areas has been because the weather has a considerable effect on pollution, and it is difficult to compare one year with another. Nevertheless, the following results have been obtained by special investigations.

The effect of introducing a small smoke control area in the middle of a large uncontrolled area was studied in Hackney, where there is a smokeless zone one mile long and half a mile

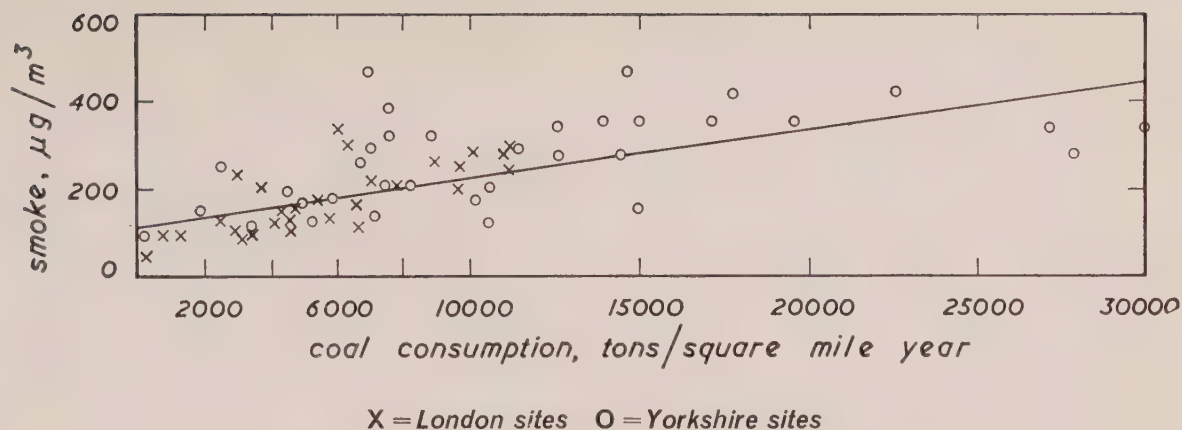


Fig. 2 Smoke and domestic coal consumption

wide. There is no heavy industry in the district, but there are a considerable number of factories and a wide variety of houses, shops and public buildings. It was found that the daily average pollution at the boundary of the smokeless zone varied roughly between the limits $150 \mu\text{g}/\text{m}^3$ and $200 \mu\text{g}/\text{m}^3$, and, during the winter of 1960-61, that the reduction in smoke at sites at least 400 yards from the windward edge of the zone averaged about $25 \mu\text{g}/\text{m}^3$. This is not a very large reduction, but in hourly measurements on one day during the following winter, a reduction of $70 \mu\text{g}/\text{m}^3$ was observed during the evening when domestic fuel consumption was at its peak.

Observations some years earlier in Hyde Park showed a much larger reduction in pollution. The smoke densities at the windward boundary of the Park varied from $150 \mu\text{g}/\text{m}^3$ to $500 \mu\text{g}/\text{m}^3$, while at the cleanest part of the Park the reduction in smoke was remarkably constant and averaged just over $100 \mu\text{g}/\text{m}^3$.

These results confirm the view that much of the pollution in an area comes from the smoke generated in the neighbouring areas, and that it is of comparatively little value to create small smokeless zones even if they happen to be those in which the greatest density of smoke is produced. To make a major impact on the problem it is necessary, as a minimum, to deal with areas of the order of 5

square miles as a single unit. Such an area would contain about 100,000 inhabitants, and the relevance of this to London and our large industrial areas is obvious.

A further extremely illuminating survey was carried out in about fifteen pairs of housing estates, which were as alike as possible except that one estate of each pair was subject to smoke control and the other was not. The average concentration of smoke over eighteen months in the smoke controlled areas was $100 \mu\text{g}/\text{m}^3$ as compared with $140 \mu\text{g}/\text{m}^3$ in the areas not subject to smoke control.* This is a most encouraging result, particularly since the smoke controlled areas were not unusually large, and it shows what can be done by changing over from coal to smokeless fuels or to oil.

The Sulphur dioxide problem

It will be seen from Fig. 1 that, whereas there has been a considerable reduction in pollution by smoke, pollution by sulphur dioxide has remained more or less constant. In addition, while London is now less

* This reduction could not be due to a greater reliance on gas and electricity in the smoke controlled areas, since this would show up in a reduction in sulphur dioxide pollution. The sulphur dioxide concentrations in both types of area were more or less the same, and this means that the reduction in smoke was due to the substitution of coal mainly by coke and, possibly to a small extent, by oil.

smoky than the industrial north, its pollution by sulphur dioxide is greater. This seems a rather surprising result, but it must be read in conjunction with Tables III and IV which show how the total amount of sulphur dioxide has increased over the years. According to these figures London has done relatively better than the country as a whole, since the concentration of sulphur dioxide at ground level has remained constant while the total amount emitted has nearly doubled. In the rest of Great Britain the total amount of sulphur dioxide emitted has only increased by 20 per cent, and this has been accompanied by no change in the concentration at ground level.

The facts quoted above, and the corresponding figures for smoke emitted and the concentration of smoke at ground level, show that much more sulphur dioxide is dispersed into the upper atmosphere than is smoke. This is because practically all smoke is produced near ground level, whereas a large amount of sulphur dioxide is emitted from tall chimneys.

The partial and gradual changeover from coal to smokeless fuels has had much less effect on the emission of sulphur dioxide than on that of smoke. The major immediate change brought about by the setting up of a smoke control area is the replacement of domestic coal by coke, which must be burned in a more efficient apparatus than the ordinary open grate. Since one ton of most low temperature coke contains only about 75 to 85 per cent of the sulphur in one ton of coal, and since 15 cwts. of coke produce as much heat as one ton of coal, replacement of coal by coke reduces the sulphur dioxide by about 40 per cent. This, however, has had little effect on the overall situation in the country since the number of smoke control areas is small and the consumption of coke represents only about 5 per cent of the fuel burned. The main factors in the last ten years have been the increasing use of oil products and electricity.

Some figures giving the amount of

sulphur dioxide emitted by burning various fuels are shown in Table V. It will be seen that the use of oil for domestic central heating produces less sulphur dioxide than does coke burned in a closed stove, but that large oil-fired central heating plants and electricity generating stations, whether coal-fired or oil-fired, are relatively large producers of sulphur dioxide per unit of heat. The sulphur content of crude oil is high, and, as shown in Tables III and IV, the increase in sulphur dioxide is almost entirely due to the increased consumption of oil. A more detailed comparison between 1952 and 1962, classified by type of user, is given in Table VI, and from this breakdown of the figures it can be seen that the increased emission of sulphur dioxide has come mainly from electricity generating stations, the emissions from all the other types of user combined being more or less constant.

Since most electricity generating stations are either situated in open country or have high chimneys which ensure the dispersal of the furnace gases into the upper atmosphere in normal weather conditions, it is not surprising that sulphur dioxide concentrations at ground level in urban areas have remained more or less constant over the last ten years.

The increasing use of electricity is bound to be the most important factor in determining the consumption of fuel as far ahead as one can see, and it therefore seems probable that the concentration of sulphur dioxide in our cities will not increase, and may well decrease, particularly if nuclear power provides a substantial part of the nation's energy requirements. Unfortunately, the weather is not always normal, and temperature inversions in the atmosphere can create conditions in which both smoke and sulphur dioxide are trapped, and this leads to smog, the most notable recent examples of which occurred in 1952 and 1962.

The smog in London in 1952 was one of the main causes for the setting

TABLE V
Emissions of Sulphur Dioxide by the Burning of Coal and Oil

Application	Fuel	Sulphur content per cent	Production of an amount of useful heat equal to that given by 1 ton of coal of 12,800 Btu/lb. burnt at 100 per cent efficiency	
			SO ₂ liberated, lb.	
			Solid Fuel	Oil
<i>Domestic heating</i>				
Open fire, old-fashioned type	..	1.6	228	—
Open fire, improved type	..	1.2—1.4	114—134	—
Closed stove	..	1.2—1.4	72—83	—
Closed stove	..	1.0	49	—
Boiler (including domestic central-heating boiler)	..	1.2—1.4	76—90	—
Boiler (including domestic central-heating boiler)	..	1.0	43	—
Boiler (including domestic central-heating boiler)	..	0.05—0.16	—	2.0—6.3
Flue-less heater	..	0.03—0.04	—	0.9—1.3
<i>Central heating</i>				
Solid fuel boiler	..	1.6	92	—
Solid fuel boiler	..	1.2—1.4	69—81	—
Solid fuel boiler	..	1.0	45	—
Oil-fired boiler, less than 500,000 Btu/h	..	0.75—0.90	—	29—36
Oil-fired boiler, greater than 500,000 Btu/h	..	1.4—2.8	—	54—108
<i>Steam raising</i>				
Industrial	..	1.6	92	—
Industrial	..	1.2—1.4	69—81	—
Industrial	..	2.5—3.8	—	96—150
<i>Electricity generation</i>				
	..	1.6	94	—
	..	3.0—4.1	—	110—150

TABLE VI
Details of emission of sulphur dioxide in Great Britain for 1952 and 1962 in thousands of tons

							1952	1962
<i>Coal</i>								
Domestic	..	..	..	..	..	..	880	850
Electricity works	..	..	..	..	..	..	950	1720
Railways	..	..	..	..	..	..	380	180
Industrial	..	..	..	..	..	..	1760	1240
Coke Ovens	..	..	..	..	..	..	100	90
Gasworks	..	..	..	..	..	..	200	160
<i>Coke</i>								
Domestic	..	..	..	..	..	..	50	80
Industrial	..	..	..	..	..	..	330	250
<i>Oil</i>								
Gas oil	..	..	..	..	..	..	20	70
Derv.	..	..	..	..	..	..	20	20
<i>Fuel oil</i>								
Electricity works	..	..	..	..	..	..	small	430
Others	..	..	..	..	..	..	220	940
TOTAL	..	..	..	..	..	..	4910	6030

up of the Beaver Committee, and it led to the Clean Air Act. In the worst polluted parts of London the smoke concentration reached 8000 $\mu\text{g}/\text{m}^3$, while the sulphur dioxide concentration reached 3500 $\mu\text{g}/\text{m}^3$. In 1962 the highest concentration of smoke recorded (averaged over 24 hours) was 4550 $\mu\text{g}/\text{m}^3$ in Hackney, and the highest (averaged) concentration of sulphur dioxide, also in Hackney, was 4570 $\mu\text{g}/\text{m}^3$. These are some ten times the peak concentrations during a typical winter evening. While the complete disappearance of domestic coal would result in the elimination of the smoky constituent of smog, it would do little to alleviate the sulphur dioxide nuisance. The only cure would be the discovery of an economic process for the removal of sulphur dioxide from flue gases, and in spite of much devoted experimental work, no promising lines of advance have appeared.

Since there is no reasonable prospect of reducing the total emission of sulphur dioxide throughout the country to negligible proportions, there is only one solution to the problem of smog, namely town planning accompanied by the control of emissions by

the regulation of fuel usage.

Ideally towns should be divided into residential and industrial areas, and the industrial belt should be on the down-wind side of the town with a gap of at least one mile between the line of industrial chimneys, which should be high ones, and the nearest houses. Heating in the residential belt should be by gas, electricity or solid and liquid fuels with low sulphur contents, while fuels containing high concentrations of sulphur should be restricted to the industrial belt. This is the ideal, and we must strive for it, and its achievement will depend upon the weight of public opinion and the actions of the planning authorities. Our existing large cities cannot, of course, be re-planned in this way, since it would be impossible to remove all industry to the periphery. But much can be done by insisting on the use of low-sulphur fuels whenever possible. If it proves to be impracticable for a sufficient number of existing users in our large conurbations to base their operations on low sulphur fuels, the only other remedy is to remove them to a properly situated industrial belt as and when the works need to be rebuilt.

Tall Chimneys and Industrial Chimney Emissions

Ministry Circular

The Ministry of Housing and Local Government has issued to local planning authorities and to local authorities a Circular (69/65) on "Clean Air: Tall Buildings and Industrial Emissions". (H.M.S.O., 3d. net).

Signed by H. H. Browne, Assistant Secretary, the Circular reads:

1. I am directed by the Minister of Housing and Local Government to draw the attention of local planning authorities to the need to give especially careful consideration to proposals for the erection of very tall new buildings in situations where they might be affected by emissions from existing chimney stacks which serve large industrial installations burning solid fuel or liquid fuel. For these purposes it may be convenient to regard as a large installation one which has an aggregate maximum continuous rating of 450,000 lbs. of steam per hour or over (at the lower end of the scale this rating represents a small power station).

2. In such situations the upper parts of the building, whether used for flats, offices or other purposes, may in certain circumstances be subjected to undesirably high peak concentrations of sulphur dioxide. Moreover, the building, by reason of the down-draughts it creates, may interfere with the normal dispersal of the plume from the stack.

3. As a rough guide it is suggested that both eventualities should be considered whenever the proposed new building would be more than two-thirds the height of the existing stack. It is not possible to lay down any generally applicable guidance about the distances from stacks within which a new building might be affected by emissions or might affect the dispersal of emissions, since much depends on the volume and temperature of the emissions, on the amounts of sulphur dioxide involved, on the size and shape of

the building and on local topographical and other conditions.

4. Local authorities are recommended to take both eventualities into account in considering proposals for buildings to be erected by them, and also in considering planning applications from other developers.

5. In addition to advice which authorities may receive from the medical officer of health, technical advice on individual cases can be obtained informally from the Ministry's alkali inspectorate. Requests for such advice should in the first instance be addressed to the Chief Alkali Inspector, Ministry of Housing and Local Government, Whitehall, London, S.W.1.

BOLSOVER SMOKE CONTROL ORDER

Suspended but not Revoked

Mr. Richard Crossman, Minister of Housing and Local Government has decided against the revocation of an Order establishing a Smoke Control area at Bolsover, Derbyshire. He has decided instead to suspend it for nearly a year.

Bolsover Urban District Council's Order setting up a smoke control area of 86 acres was made in 1962, confirmed by the then Minister in November the same year, and came into effect on 1 July, 1963. However, in June 1964 the Council made an Order for its revocation on the grounds that it caused hardship to some residents in the area, by whom it was claimed that smokeless fuel was more expensive than coal and gave less heat.

A public inquiry into the revocation order was held on 20 July, and the Inspector who held it recommended against confirmation. He found that whilst the operation of the Smoke Control Order might have caused some financial hardship there were no local reasons why control was not appropriate to Bolsover nor why the cost of smokeless fuels should cause any more hardship there than in any other town.

The letter giving the Minister's decision states:

"The Minister has considered the Inspector's report and the written and oral evidence submitted. He is satisfied that coke, when it is correctly used in a modern appliance designed for burning it, and Coalite are capable of providing efficient and economical heating. There are supplies of gas coke and, for those who prefer it, the more reactive "Coalite" for the smoke control area.

"The Minister accepts the Inspector's recommendation and has accordingly decided not to confirm the revocation order.

"The Minister has considered the Council's request at the inquiry that if he did not confirm the revocation order he should suspend the operation of the existing smoke control order. Having regard to the Inspector's view that a contributory cause of the lack of success of the smoke control order was the difficulty experienced by pensioners and some of the other residents in the area in adapting themselves to the techniques of burning smokeless fuels, the Minister has decided to suspend the operation of the order until 31 August, 1966 to give the Council an opportunity to arrange for the residents concerned to be given suitable guidance on the matter.

"At the inquiry the council also requested that the Minister should investigate the possibility of an increase in the concessionary smokeless fuel allowances. This seems to be a matter between the National Coal Board and the National Union of Mineworkers, but the Minister is considering whether there is any action which he could usefully take."

The letter concludes by stating: "the Minister notes that the Council formed the intention, in 1962, of proceeding with smoke control until the whole of their area was included in smoke control orders. He is naturally concerned to find that they have now sought to revoke the one order they have made, for reasons which do not, in his view, justify this course. He considers it specially important in the areas most populated by smoke that local authorities should press forward with smoke control, and therefore asks the Council to consider again whether they should not make a renewed effort to bring the benefits of a cleaner and healthier environment to the inhabitants of their area."

Obituary

F. E. TYLECOTE

We regret to record the death, on 7 October in hospital at Manchester, of Professor Frank Edward Tylecote, C.B.E. He was 86. Professor Tylecote was for many years a member of the Executive Council of the Society, and was President in 1952-53.

F. E. Tylecote was well known in the medical world, and a leading figure in Manchester, where he was, from 1914, honorary physician to the Manchester Royal Infirmary, and later Professor of Medicine in the University. He took a keen interest in municipal politics, first as a Liberal and then as Conservative, and served on Manchester City Council both as a councillor and an alderman. His concern with public affairs led him to take a part in the work of many medical and public health bodies, making for instance most appropriate for him his chairmanship of the Public Health Committee of the Association of Municipal Corporations. He was highly respected for his medical knowledge and experience and could be an entertaining companion, but as the obituaries in the medical journals have admitted, he was a difficult man to know. His first wife died in 1930, and he was later married for a second time to Mabel Phythian, Ph.D. She too was a keen politician, but a socialist.

F. J. Eaton Retires

Dr. Eaton, Deputy Director of the Gas Council's research centre, Watson House, retired in September. He was for a number of years the representative of the Institution of Gas Engineers on the Executive Council of the Society, and a valued member of the Technical Committee. He has given 40 years' service to the gas industry.

He is succeeded as Deputy Director by Mr. W. D. Ellis, O.B.E., previously Assistant Director.

INTERNATIONAL SECTION

Australia

Clean Air Conference, Sydney

by

F. E. Ireland

Chief Alkali Inspector

The New South Wales Department of Public Health and the New South Wales University together organized a Clean Air Conference in Sydney from 17 to 20 August, 1965. This followed an earlier conference in 1962 at which one of my predecessors, Mr. W. A. Damon, C.B.E. presented two papers. On this occasion I was one of five guest speakers from overseas, the others being Mr. John Fairweather (President, American Air Pollution Control Association and Director of San Bernardino Air Pollution Control Department), Dr. John Goldsmith (Medical Officer, United Nations, Geneva, seconded for two years from Los Angeles County Air Pollution Control Department), Mr. Smith Griswold (Director of Los Angeles County Air Pollution Control Department) and Professor Scorer (Imperial College, University of London).

The conference was held in a modern lecture theatre in the University of New South Wales and was opened by the Minister for Health, the Honourable Mr. A. H. Jago. The Conference Secretary, Dr. J. L. Sullivan (Chief Engineer, N.S.W. Department of Air Pollution Control) presented the first paper on "Progress in Air Pollution control in New South Wales". I followed with "Achievements under the Alkali Act", and then Mr. Smith Griswold spoke about air pollution control in the U.S.A. During the following three days 29 technical papers were presented by their authors and these and the discussions which

followed were of an exceptionally high quality. The papers covered a wide range, but generally dealt with three different aspects of air pollution—(a) Effects, Research and Meteorology, (b) Control, (c) Social and Legislative—and it was helpful to have so many of the lectures demonstrated with slides and films. The majority of papers were pertinent to Australia, but others were of a more general interest.

It might be wondered why such a vast continent as Australia, with only 11,000,000 people, should have such a deep interest in air pollution. The answer is simply that any concentration of people and industry into large towns and cities, no matter how isolated they are from each other, produces local problems of air pollution, not the least of which is that from the internal combustion engine. Indeed, at the Sydney Conference, Mr. Smith Griswold gave it as his opinion that Sydney had the special characteristics which could lead to trouble with photochemical, or Los Angeles type, smog whose precursor was the motor car. There are three Australian cities with a population of over 2,000,000 and the public health authorities in these and other large centres are relatively isolated by the large distances, not only from each other but also from other industrialized countries, and the conference is a wonderful opportunity for them to get together and discuss mutual problems.

Visitors to Australia must be

prepared for rigorous cross-examination, for the Australians are anxious to know what is happening elsewhere and make good use of others' longer experience. It is a young and vigorous country with a spirit of confidence and adventure. Writing letters to each other is an efficient way of reaching misunderstanding and the discussions inside and outside the lecture theatre were a valuable part of the conference. Among those who participated actively were air pollution control officers from New South Wales, Victoria, Queensland, Western Australia and our old friend Mr. R. T. Douglas from New Zealand. The conference concluded with a resolution recommending the Government to seek membership of the International Union of Air Pollution Control Associations.

Prior to the Conference and on my way to Sydney, I was able to spend a

few days each in New York, Pittsburgh, Chicago, Los Angeles and San Francisco exchanging views with air pollution control departments, visiting works or touring the areas. Much valuable information was accumulated and I was able to explain what was meant by the misleading words "Alkali Act" and what the duties of the Alkali Inspectorate were. I spent a week in Australia before the Conference as the guest of the New South Wales Health Department discussing pollution prevention, visiting works and seeing the country. At the invitation of the Victoria Health Department I slipped down to Melbourne one day and returned to Sydney the next, a round trip of about 900 miles.

All of the overseas visitors were full of praise for the excellent organization and hospitality of our hosts and it was well deserved.

West Germany

ALL STATES WANT CLEAN AIR

Following is a translation of an informative report published in *Die Welt*, 6 August, 1965.

The measures for reducing air pollution which are energetically pursued by the Land* of Nordrhein-Westfalen are to help in making the Ruhr-District more attractive by improving the living conditions of the people. However, some apprehension has been expressed that by the conditions which are set up for the factories the attraction of the Ruhr-District would be reduced for new industrial foundations.

Some enterprises also mentioned that the regulations for keeping air and water clean could make them look for different areas to start a new branch. However, this would not be of any help to them because all Länder of the Federal Republic will set up directions against air pollution.

A conference of the ministers and senators responsible for health in the Länder has put this demand at the beginning of a resolution for keeping the air clean. A working committee under the director of the Institute for Hygiene in the Ruhr-District, Prof. Wüstenberg, worked out suggestions which should be accepted by all Länder as the base of their measures against air pollution. It is to be guaranteed that in the whole Ruhr-District measures for keeping the air clean have to be applied which are co-ordinated in the hygienic, technical, economic and legal respects. According to the example of Nordrhein-Westfalen, other Länder have passed or prepared similar laws.

The principal factors of the suggestions are problems of the danger of exodus from crowded areas and founding new industries in non-industrial areas. Prof. Wüstenberg said that co-ordination of measures is of greatest importance, otherwise the problems would only be shifted from one area to the other without being solved.

Increased attention has to be given

* State, or State Government.

to the separation of housing and industrial areas. Enterprises that have to obtain a new licence will only be allowed to establish themselves in special areas, with little or no population. The consequence might be that even existing older enterprises might decide to move.

Sufficient natural recreation areas have to be preserved and the stock of trees has to be protected. Through-traffic, particularly that of lorries has to be diverted from town centres to thoroughfares. One of the most important measures against air-pollution is to build streets that by-pass the town centres.

The ministers of the Länder further believe it is necessary to supply larger and especially new settlements with district heating. A law should make it obligatory to use such heating systems. Prof. Wüstenberg mentioned that for instance the use of water supply and draining is obligatory by virtue of local statutes. Therefore, the same method could be applied for heating since enough progress has been made in developing the district heating systems.

The conference of the Ministers of the Länder suggests more intensive investigation of the effect of air pollution on people and animals, on plants and objects. Installations for decreasing air pollution should be promoted by tax reductions and development of air cleaning systems should be supported by government funds.

France

“LA MÉTÉOROLOGIE”

We have been presented with a special number of *La Météorologie*, the quarterly journal published by the Meteorological Society of France. This sizeable volume (248 pages) is dated January-June, 1963 and entirely devoted to the subject of atmospheric pollution. In bringing out this special issue, acknowledgment is made to the assistance received from the organi-

zation well known to us: Centre Interprofessionnel Technique d'Etudes de la Pollution Atmosphérique (C.I.T.E.P.A.). The 11 illustrated scientific papers deal with, among others, such subjects as the height of industrial chimneys, various meteorological phenomena relating to air pollution, and electrostatic precipitation.

U.S.A.

H. E. W. PUBLICATIONS

Three new air pollution publications have been received from the U.S. Department of Health, Education and Welfare. There is *Selected Methods for the Measurement of Air Pollutants*, which is a handbook of analytical procedures prepared by the Division of Air Pollution. It covers the determination, by various methods, of sulphur dioxide, nitrogen oxides, oxidants (including ozone), aliphatic aldehydes, acrolein, formaldehyde, and the determination in atmospheric suspended particulates of sulphate and nitrate.

Next there is a most useful reference manual: *A Compilation of Selected Air Pollution Emission Control Regulations and Ordinances*. This is sectionalized by reference to the nature and purpose of various types of regulation, such as smoke emission, particulate emissions, sulphur compounds, fluorides, motor vehicles, etc., with the relevant section of the selected ordinances quoted for each. Also included is a glossary of definitions of terms included in air pollution ordinances.

Also from the same office is a further report on what the public think about air pollution. (See the detailed review of another inquiry in the last issue of this journal). This smaller report is entitled *Community Perception of Air Quality. An Opinion Survey in Clarkston, Washington*. Clarkston is a community of 7,000 population located seven miles downwind from a pulp mill. Of those interviewed 91 per cent perceived

air pollution as problem of visibility; 62 per cent as a problem of nose-throat irritation. The abstract to the report concludes: "Although exposure to odorous pollutants in ambient air appeared roughly equal to all members of the sample, their concern with air pollution was found to vary directly with social status and attitude characteristics such as civic pride, desire to ameliorate the situation, length of residence in the community, and occupational prestige of the household head".

From the Centre for Air Environment Studies, Pennsylvania State University, comes a further reference work. It is an *Index to Air Pollution Research*, which covers a wide field of government supported research in progress in the U.S.A. The Index was prepared by a high speed digital computer and employs a new method of indexing information. Indeed, interest in the publication is apt to be divided between the subject matter and the manner in which it is presented. The extensive cross-referencing makes the index seem much more formidable than in fact it is.

INTERSTATE POLLUTION CASES

Two abatement conferences on interstate air pollution alleged to endanger the public health of welfare in the areas of Selbyville, Delaware, and Shoreham, Vermont, were announced today by Secretary of Health, Education and Welfare, John W. Gardner.

The Secretary acted under authority of the Clean Air Act of 1963 which directs him to call a conference whenever a State or municipal official advises him that residents of his State are endangered by air pollution originating in another State.

The Governor of Vermont has asked the Secretary to take action in connection with air pollution said to come from a pulp and paper mill operated in Ticonderoga, New York, by the International Paper Company. The Delaware Commissioner of Health

has requested similar action concerning air pollution said to be caused by the Bishop Processing Company in Bishop, Maryland.

The Public Health Service's Division of Air Pollution is now arranging for the two conferences.

SO₂ Removal

The October, 1965 issue of *Air Pollution Control*, the journal of the Air Pollution Control Association of America, contains a review on *Evaluation of Dry Processes for Removing Sulphur Dioxide from Power Plant Flue Gases*, by D. Bienstock, J. H. Field, S. Katell and K. D. Plants. The survey deals with recent developments in dry techniques and includes process flow-sheets, operating conditions, bye-product yields, and relative costs. The Reinluft, the alkalized alumina, and the catalytic oxidation processes are examined.

Japan

EXHAUST SURVEY

Japan Times, Tokyo, has reported a three-day survey on the effects of vehicular exhaust gas on the human body, carried out in a residential district, and a further six day survey on highways. Residents co-operated by being tested for carbonyl-haemoglobin in the bloodstream and examination of lung functions. Automatic recording instruments for carbon monoxide and hydrocarbons were also in use. Upon this, and other projected surveys will be based future action to reduce air pollution from exhaust fumes.

Greece

Parthenon in Danger

The Greek Parthenon, one of the oldest tourist attractions in the world, is threatened by some of the newest troubles—decay brought on by scream-jets, air pollution and high heels.

Greek architects and engineers who have just carried out a survey of the 2,300 year-old temple, which crowns

the hill of Acropolis, have found that the monument is in grave danger of collapse.

They say jets flying into nearby Athens Airport cause vibrations worse than earthquakes.

The air pollution, a by-product of the growing number of factories in Athens, is corroding the honey-coloured marble from which the great temple is built.

The high heels of thousands of women sightseers are gradually chipping away the floor of the temple.

To add to the decay, the limestone foundations are softening because of rain and vibration.

The press report from which we quote above, concludes by saying that the survey group has suggested that the temple should be protected by completely covering it with a great glass case!

U.S.S.R.

ACOUSTIC COAGULATION

This research report is included as a Russian reference but is in fact an authorized translation into English by Consultants Bureau of New York. By E. P. Modnikov, the full title is *Acoustic Coagulation and Precipitation of Aerosols*. It is a detailed and comprehensive survey of its subject, which will be of importance and guidance to those working in this interesting but highly specialized field.

Israel

Complaint about Control Delays

On 3 October, the Supreme Court in Jerusalem issued a order nisi calling upon the Minister of the Interior to show cause within 30 days why his Ministry had not issued the regulations envisaged by the Kanowitz law against air pollution.

The order nisi was granted at the request of Dr. Y. Zamir and Dr. A. Goldberg, counsel for eight lecturers at the Hebrew University. In their request for the order the two lawyers

pointed out that although the Kanowitz law was passed $4\frac{1}{2}$ years ago, the Minister has not yet issued the relevant regulations.

As long ago as 20 November, 1962, the then acting Minister of the Interior had informed the Knesset (Israeli Parliament) that the Ministry had been asked to expedite the drawing up of these regulations. He hoped that it would be possible to publish them within three months from the date.—*European Chemical News*.

Argentina

BUENOS AIRES CONGRESS

The International Air Pollution Congress, organized by the Asociacion Argentina Contra la Contaminacion del Aire, was held from 15 to 19 November. A full report will be given in our next issue. It was attended by a score or more guest delegates from overseas, including the Director of the N.S.C.A. from Britain, as well as many Argentinians. Over 70 papers were read or presented.



A C.U.C. representative and an interpreter explain both British heating methods and smoke control area requirements to a charming, but perhaps puzzled, Pakistani newcomer, Mrs. Singh, at Huddersfield

From the Fuel Industries

REPORT FROM THE N.C.B.

National Coal Board, Report and Accounts, 1964-5. H.M.S.O., London. Report, 5s. 6d. Accounts, 16s. 6d. net.

One of the most telling figures in the new report is that the average productivity for the year is 24 per cent higher than in 1960, and was 4.2 per cent higher than in the previous year.

New systems of mining point to even greater increases in the future. Remotely-operated longwall face installations which have operated experimentally at two collieries have proved successful and more are to be introduced. Work is also well advanced on the remote control of colliery operations as a whole.

The principal vital statistics (with the 1960 figures given in brackets for comparison) are: coal output, 192.5 million tons (193.6); inland consumption 187.3 million tons (202.2); average manpower (N.C.B. mines), 491,000 (602,100); output per man-shift (all workers), 34.8, (28.0) tons; mechanized output percentage, 75.0, (37.5).

On the financial results the report says, much to the point in its first sentence: "In the year to March 1965, the profit on the Board's operations was £42.8 million before payment of £42.7 million of interest charges."

On consumption, all classes of use show falls compared with the previous year, except power stations and coke ovens. The largest fall, in percentages, was from railways (25.6), gasworks (9.8), and domestic consumers (6.1). There was a serious fall in exports, but later information suggests that this may only be temporary. Summing up prospects, the report stresses the importance of the new techniques of automated and remote control, mentioning that the new Bevercotes colliery (described in our last issue),

"will provide a pattern for the mining industry of the future".

The Smokeless Fuels

From our special point of view the parts of the report dealing with the processed smokeless fuels are of importance. For the factual information these paragraphs (99-102) contain, they had better be quoted verbatim:-

Demand for "Phurnacite", a premium quality boiler fuel, remained strong, 808,000 tons being sold during the year. Output at the "Phurnacite" plant at Aberaman in South Wales has been progressively increased from 637,000 tons in 1960 to over 800,000 tons in 1964-5. This expansion has not been sufficient to meet increasing demand and further expansion is restricted by a shortage of the special coals required and by the limitations of the site. The Board have, therefore, developed a new high quality, smokeless boiler fuel based on the mild heat treatment of briquettes made mainly from anthracite small coal. The new fuel, which will be called "Phurnacine", has been designed mainly for boilers but will also be suitable for burning in most types of roomheaters. Work began in May, 1964, on a new plant at Cardiff, which will start producing "Phurnacine" for the winter of 1965-6 at the rate of 110,000 tons a year.

Good progress was made during the year in the building and planning of commercial plants for the production of "Homefire" and "Roomheat". "Homefire", the new premium smokeless briquette for the open fire, will be produced at the full scale commercial plant now being built at Coventry. The plant will begin production in the autumn of 1965 and will steadily build up to a total output of over 600,000 tons a year. During 1964-5, small quantities of "Homefire" were produced at the experimental pilot plant at Birch

Coppice and marketed in selected areas.

At the end of the year, work was nearing completion on a plant at Markham Main to produce "Roomheat", a new smokeless fuel for roomheaters and the open fire. This plant will start production by the winter of 1965-6 and will produce 120,000 tons a year. An extension to the Markham plant, which will produce a further 120,000 tons a year, is to be built later in 1965. Planning

work has started on "Roomheat" plants at Rufford, in East Midlands Division, and at Killoch, in Scottish Division. Sites for further plants are being considered in Lancashire and the West Midlands.

"Roomheat" plants can be built in little more than a year. The speed with which these plants can be constructed and commissioned will enable the Board to increase rapidly the production of "Roomheat" to meet the requirements of the market.

REPORT ON GAS

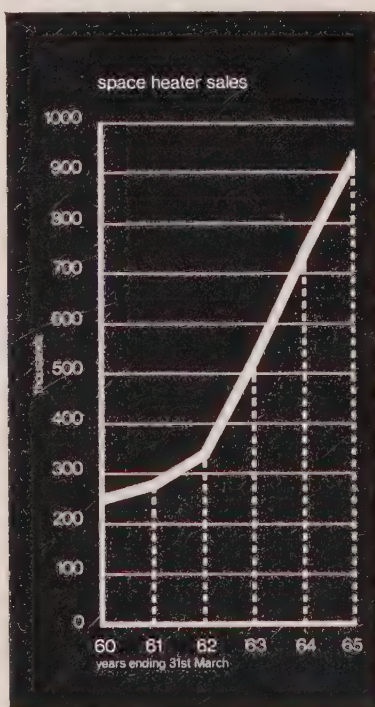
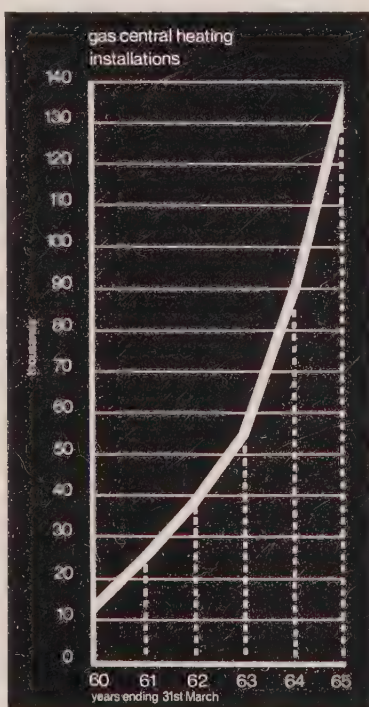
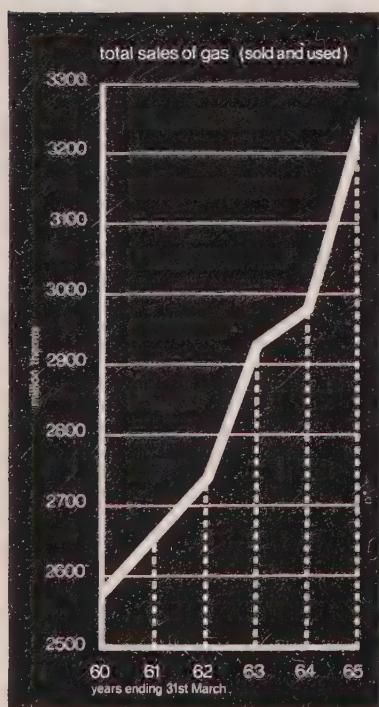
Annual Report and Accounts, 1964-5.
The Gas Council. H.M.S.O., London,
16s. 6d. net.

The Gas industry continues its jubilant process of rejuvenation, as the new report demonstrates. Eleven of the Area Boards showed a surplus, and only one (Scotland) a deficit. The total surplus was a record of £15 million. How sales records for gas and equipment continue to be broken is shown by the charts below. They speak for themselves and repetition is unnecessary.

What is of special importance to

the industry is the successful development of the scheme for the importation of liquefied natural gas, which is now being used by eight of the Area Boards. There are also the new gasmaking processes, the Gas Re-cycle Hydrogenator and the Catalytic Rich Gas process. Many details of these developments were given in the paper by Mr. R. N. Bruce at the recent conference at Eastbourne.

On clean air specifically, the report says that supplies of the industry's solid smokeless fuels continued to be available in sufficient quantities for



How gas sales have grown since 1960

existing smoke control areas. Since so much has been said about difficulties in obtaining solid smokeless fuels it is surprising to note that the sales of the premium fuels "Clean-glow" and "Phimax" declined. Gloco and Seprite sales were satisfactory, but the commercial and industrial markets for coke declined still further.

The report refers to the research progress, and the progress already made in practice on the removal of carbon monoxide from gas. The Boards are planning to achieve a limit of five per cent to all gas supplies within five years.

Reference is made to the Gas Act, 1965, which extends the functions of the Gas Council and facilitates the underground storage of gas. For meeting peak loads and making a much greater supply of gas readily and

economically available at all times, underground storage is most important to the continued progress of the clean air programme, and it is satisfactory that, after various difficulties, the way ahead is now cleared. Search for suitable storage sites is now in progress. Before storage can be undertaken, in any case, an authorization order must be made by the Minister of Power. Safety and the need to protect water supplies must be taken into account, and other needs to be taken into account include the natural beauty and features of the countryside and the protection of buildings and other objects of interest.

Other sections of the report are on the considerable and varied research that is in progress, and on marketing, public relations and advertising—the sphere in which "High Speed Gas" comes into its own.

REPORTS ON ELECTRICITY

Electricity Council, Report and Accounts 1964-65 Central Electricity Generating Board, Report and Accounts 1964-65 H.M.S.O. 14s. 6d. and 9s. 6d. net.

The electricity supply in England and Wales continues to expand by about 7 per cent per annum. During the year under review total sales of electricity amounted to 130,019 million units of which 58,003 million units went to industry, 47,253 million units to domestic consumers, 17,483 million units to commercial users. There was a remarkable increase in off-peak sales which amounted to 3,897 million units. Off-peak sales to domestic consumers increased by 95.2 per cent.

The total revenue including income from contracting and sales of fittings amounted to £991.1 million and expenditure on revenue account to £927 million having a gross return of £64.1 million, being 12.1 per cent return on net assets, which will be used to finance capital requirements.

The number of consumers at 31st

March 1965 was 16,964,635 an increase of 9 per cent and the average price of electricity to consumers was 1.652d. per unit compared with 1.622d. per unit in the previous year.

The Central Electricity Generating Board had 233 stations in commission with a total capacity of 34,359 M.W. from which the total output amounted to 141,022 million units. 1,205 M.W. of new plant was brought into commission during the year.

This increase was less than expectation. The size and complexity of generating units continues to increase and it is undesirable to regard plant as fully available as soon as the turbo-generator has been synchronized. It is necessary to allow a 'running-in' period and plant is not regarded as available until it has completed 72 hours continuous operation on full load.

A number of 500 M.W. units are under construction and specification has been prepared for 660 M.W. units operating at 3,500 lbs. per square



The 500,000 kW nuclear generating station at Trawsfynydd, North Wales (from the Electricity Council report)

inch, with double reheat. It is envisaged that the first units at Drax, Yorkshire will be of 660 M.W. capacity.

An emergency programme of six gas turbine stations has been put in train with an aggregate capacity of 720 M.W. In addition all new stations at present under construction include either a 17.5 M.W. or 25 M.W. gas turbine set associated with each 500 M.W. unit.

Thermal efficiency at new power stations continues to improve and that at West Thurrock reached 35.78 per cent. The average thermal efficiency during the year was 27.49 per cent compared with 27.67 per cent for the previous year. The fall was due in a measure to delays in commissioning new efficient plant giving rise to an increased running of relatively old and inefficient plants for long periods.

The maximum demand met amounted to 31,328 M.W. on 5th January 1965. The system load factor was 51.8 per cent. The Boards two nuclear stations Bradwell and Berkeley during the winter months operated at a load factor of 95 per cent.

The Coal Board's effort to increase production from efficient low-cost coalfields should help to maintain coal as a competitive fuel and it is anticipated that coal consumption should increase to 1969-70. To avoid fluctuations in the demand for coal, the Generating Board intends to use coal in all cases in preference to oil where the extra cost is not excessive.

It is general practice to use a single chimney of some 600 feet for 2,000 M.W. stations so that flue gases are emitted high into the atmosphere. In order to ensure that flue gases can be emitted quickly, chimneys are being fitted with internal flues so that efflux velocity can be maintained even at reduced loads.

In the nuclear field capital cost reductions have been achieved from £185 per K.W. for Berkeley to £103 per K.W. for Wylfa. The second station at Dungeness will operate on the advanced gas-cooled reactor system. It has been computed that the cost of generation should be at least 10 per cent less than that of the more efficient coal-fired stations.

The cross channel link was utilized for the transmission of 296 million kWh to France and for the reception of 77 million kWh from France. 563 million kWh were sent to Scotland and 138 million kWh were received from Scotland.

Until a few years ago London was electrically self-supporting but is now increasingly dependent on outside supplies. The Board regretted very much that the Government had refused to allot a part of the site of Woolwich Arsenal for an additional power station to serve the London area.

Research has been directed by the Electricity Council in conjunction with the South of Scotland Electricity Board and the North of Scotland Hydro-Electric Board into problems of generation and transmission of electricity and into methods of use of electricity by consumers. Attention has been directed to improvement in design of boilers, turbine casings and others matter. Some items of research are carried out for the Board by Universities. Attention has been directed also to the direct conversion in the form of hot ionized gas into electric power.

N.I.F.E.S. Makes Progress

The Progress Report for the year ended 31 March, 1965, of the National Industrial Fuel Efficiency Service (71 Grosvenor Street, London, S.W.1) once again shows how valuable a service the organization is rendering to the nation's economy. Efficiency in the use of energy is just as important as ever it was. As it has developed, N.I.F.E.S. is now less dependent on its sponsors—the principal fuel industries—and is relying more on the fees it makes for its services to the users of fuel. In the year under review the sponsors contributed £183,729, and fees earned were £391,513.

To secure an abatement of air pollution is only occasionally a primary reason for a N.I.F.E.S. investigation, but more frequently the promotion of efficiency promotes clean air as an incidental benefit. The outcome of the fuel efficiency programme is summed up in the following statement:

In 1953, when the Gross Domestic Product was valued at £18,000 million, the total inland consumption of fuel was 234 million tons of coal or equivalent.

In 1964, when the Gross Domestic Product amounted to nearly £25,000 million, the total consumption was 285 million tons.

This means that the Gross Domestic

Product at 1958 prices increased by 37 per cent during the eleven years, whereas fuel consumption increased by only 22 per cent.

The reduction in demand for fuel in relation to the Gross Domestic Product is, therefore, of the order of 37 million tons a year.

Without this improvement in efficiency, and also without the added impetus of the Clean Air Act, there would have been an increasing, instead of a steadily decreasing, amount of air pollution.

The main clients of N.I.F.E.S., classified over the eleven years of work, make an interesting summary of the kinds of industry that have needed help in their fuel problems. The largest numbers come from textiles and leather, engineering and metals, food, drink and tobacco, and from non-industrial premises. The total over the eleven years is 7,424.

The report includes a number of case histories that make interesting reading both in themselves and for the general picture they make of the kinds of problem that face British industry and the kinds of solutions that may be applied.

N.I.F.E.S. is one of the clean air movement's best allies in the field of industry. We welcome its continuing success.

Air Pollution from Power Stations

by

S. R. Craxford*

A LARGE modern power station, for example, a station of 2,000 megawatts capacity, emits annually about the same amount of atmospheric pollutants—grit and dust, and sulphur dioxide—as an industrial city of a million inhabitants. When the possibilities are considered of controlling pollution near ground level arising from these two equivalent emitters it is clear that the centralization of power production at one point offers very great advantages. In the first place, within limits, the site can be chosen to keep pollution reasonably distant from urban areas. Then, it is economically advantageous to equip a large power station with the most efficient combustion system possible, whereas on a small scale this is not always so. The result is that the large power station does not produce smoke. Similarly the cost of installing and operating the most efficient types of flue gas cleaning equipment is proportionally less on the large scale, as is also the cost of a high chimney to ensure adequate dispersion of the flue gas. Thus a power station can, without technical or economic difficulty, be operated to give average levels of air pollution in its vicinity orders of magnitude less than the average pollution in a city with the same annual fuel consumption.

However, these low average figures for pollution from a point source are only achieved at the expense of allowing high concentrations of pollutants to occur for short periods—

a quarter of an hour, say—in restricted zones downwind, zones that are continuously moving from one place to another following the continuously changing direction and speed of the wind. The main problem of air pollution from power stations is to keep these short-period maximum concentrations within tolerable limits. The discussion in the first sections of this paper is concerned with these problems and suggests that, at least up to the moment, they are being dealt with satisfactorily by the designers of modern power stations.

Looking carefully at the present position and making a reasonable estimate of the future development of the electricity industry, there are signs that a new difficulty may be on the point of arising, as a result of the economic pressure to concentrate modern giant power stations in a small area, on the coalfield that provides their fuel. In the United Kingdom the concentration in the Trent Valley in Nottinghamshire, on the East Midlands coalfield provides one example, and on the continent of Europe, the concentration on the brown coal deposit in the valley of Northern Bohemia, in Czechoslovakia, is another notable instance of this type of development. When this occurs, the possibility of the overlapping of areas subject to short period high pollution from different power stations must be taken very carefully into account so that at any point the frequency with which short periods of high pollution are liable to occur does not become excessive. Even with the flat terrain in the Trent Valley it is not beyond the bounds of possibility that, whatever the height of the chimneys, the absolute amounts of sulphur dioxide emitted in the region might have to be limited. In

*Excerpts from a Paper read to the Pro Aqua Congress, Basle, March, 1965, which is to be published in full by PRO-AQUA-Band (R. Oldenbourg Verlag, Munich).

the Czechoslovak example the position is exacerbated by the steep walls of the valley and it would appear to the author that high chimneys and natural dispersal are unlikely to provide a solution to the problem and that recourse will have to be had to the limitations of emissions of sulphur dioxide. For these reasons the possibilities of removing sulphur dioxide from flue gas are examined in the later part of this paper, because however unpopular such proposals have been in the last few decades it is possible, or perhaps likely, that in the near future some such treatment of flue gas may have to be introduced where there are strong reasons of economics for siting a power station where the natural dispersive powers of the atmosphere are inadequate, either on account of topography or of excessive emissions.

If a discussion of air pollution around power stations is to have practical relevance, the question of what degree of pollution may be regarded as acceptable must be faced. In the United Kingdom no maximum allowable concentrations are defined and there are no regulations fixing the height of a power station chimney in relation to the rate of emission of pollutants from it. A good deal of information about the official view of what pollution is tolerable and what is not can however be obtained from the reports of the Public Inquiries that are often held by Inspectors from the Ministry of Power and the Ministry of Housing and Local Government on proposals for new power stations. At these enquiries the Central Electricity Generating Board—the nationalized electricity industry—makes a case for erecting the power station, and this case includes estimates of the air pollution that the new station will be responsible for. The objectors produce expert evidence to try to invalidate this case and much of the argument usually turns on the air pollution questions. The summing up and the decisions of the Inspectors provide information on what is officially regarded as a tolerable

degree of pollution. Part of this paper is based on information in the Inspector's Report of the Public Inquiry on the proposed power station at Ratcliffe-on-Soar, in 1963.

This power station may be taken as typical of those now projected or under construction in the United Kingdom. It is a 2,000 megawatt station, designed to burn 5 million tons of coal a year in pulverized fuel boilers. The chimney will be 200 metres high and the flue gases issuing from it will be at a temperature of 100°C and have a velocity of 23 metres per second.

Grit and Dust

The type of coal used in the United Kingdom for these modern power stations contains some 20 per cent of ash, so that the gas cleaning equipment of the power station described in the preceding paragraph will only have to deal with some three-quarters of a million tons of grit and dust a year as, in that instance, 15 per cent ash coal will be used. The Central Electricity Generating Board consider that by using a mechanical pre-collector followed by an electrostatic precipitator it should now be possible to maintain the design efficiency of 99·3 per cent; the pre-collector protects the precipitator from gross disturbances. This high efficiency can, naturally enough, only be achieved at a cost, and it is estimated that the plant required may cost as much as 12 per cent of the cost of the boiler units. With this efficiency of collection, the amount of fine dust passing the precipitator and issuing from the chimney will be about 5,000 tons per annum.

For the example under consideration, the expected particle size distribution of this dust is as follows:

(A particle has a free falling speed of 1 vel if it falls at a rate of 1 cm./sec. in still air at 20°C). From these figures it is a simple matter to estimate the rate of all-out of dust, using the standard formulae for the dispersion of chimney gases. The calculations indicate that, for an average wind speed

<i>Size range (microns)</i>	<i>Free falling speed (vels)</i>	<i>Fraction of dust (per cent)</i>
above 89	above 40	1
89-59	40-20	1
59-41	20-10	1
41-18	10- 2	2
below 18	below 2	95

of 6 metres per second, the maximum rate of fall-out should be 1.2 milligrammes per square metre per day, and that this maximum fall-out should occur between 3 and 5 kilometres from the chimney. These figures are subject to errors inherent in the methods and the actual figures may lie within a factor of ± 2 from them, *i.e.*, up to 100 per cent higher or 50 per cent lower than the calculated figure. This is entirely negligible as the average rate of deposit of grit and dust in an industrial town is about 100 mg./m² day.

While there is no direct evidence to confirm the results of this calculation, there is a certain amount of circumstantial evidence to indicate that a 2,000 megawatt power station should not give rise to a serious dust nuisance. Thus, the same type of theoretical calculation, when applied to three other power stations, of capacity up to 375 megawatts, indicates that the maximum rates of dust-fall should be 3, 1.7 and 1.3 mg/m² day respectively. Since no dust nuisance is experienced in the vicinity of these stations it is unlikely that there will be a nuisance from the 2,000 megawatt station for which the calculated rate of dust-fall is 1.2 mg/m² day. Again, in the United Kingdom some 800 British Standard Deposit Gauges are operated continuously up and down the country by Local Authorities and the results are correlated and published by the Warren Spring Laboratory. When the data from this survey are compared with rates of deposit observed with the same type of deposit gauge by the Central Electricity Generating Board

at sites around their power stations, it is found that rates of deposit near power stations are no higher than those observed at sites otherwise similar but remote from power stations.

In many instances the C.E.G.B. have measured dust-fall around sites of power stations for two years before the station came into operation and for two years after to try to assess the increase in dust-fall attributable to the power station, but the interpretation of the results is difficult, as in some instances the rate of dust-fall in the vicinity decreased when the power station started up, and in others it increased.

In concluding this section on grit and dust it should be added that a 2,000 megawatt oil-fired power station would emit almost the same amount of dust although the elaborate and expensive electrostatic gas cleaning equipment would not be required.

Sulphur Dioxide—Natural Dispersion from High Chimneys

Very many different methods have been proposed for calculating the rise of a plume of gas issuing from a chimney into the air on account of its buoyancy, its subsequent dispersion through the atmosphere and hence the pollution that may be expected from it at ground level. In the United Kingdom it is the practice to base estimates of pollution that may arise from projected power stations on the classical theoretical calculations of Sutton and of Bosanquet because the latest modern ways of thinking about the problems of dispersion, backed up by observations of the behaviour of chimney plumes tend to indicate that, at least for power stations up to the size now being built or projected, the classical formulae give estimates rather on the high side. Their use therefore is equivalent to including a factor of safety in the design data.

The classical method relies on a purely theoretical calculation of thermal rise; the modern treatment is based on an empirical formula set up by observation of zero-lift balloons released from chimneys under various

conditions and which allow the actual position of the plume to be plotted. The formula is consistent with one of the theoretical treatments previously proposed. The experimental observations of the balloons do not define the instantaneous position of the plume, but rather the envelope within which the plume is waving about during the period, say an hour, required for the observations. The view is then taken that it is a great deal more realistic to consider the spread of this envelope, rather than to attempt to define the instantaneous, or three-minute, spread of the plume, as is done in the classical treatment. The spread of the envelope in a horizontal direction is brought about by changes in wind direction and the spread in a vertical direction arises from the effect of changes in wind speed on thermal rise under the forces of buoyancy. In this way it is easy to calculate the maximum hourly concentration of sulphur dioxide to be expected and then to work back to the maximum short-term concentrations that could occur within the envelope. This modern viewpoint would appear therefore to be sufficiently firmly based on observations to give confidence in the comparison with the results of calculation by the classical formulae which tend to show that these latter give an over-estimate.

To return now to the 2,000 megawatt coal-fired power station that is being taken as an example of present-day practice. For the Ratcliffe-on-Soar project, the East Midlands coal that will be used has an average sulphur content of about one per cent so that the annual emission of sulphur dioxide will be about 100,000 tons. On this basis, calculation of the maximum short-term, three-minute, concentrations of sulphur dioxide downwind of the stack for normal weather conditions can be made by the classical methods and may be accepted subject to an error of a factor of 2 either way. For an average wind speed of 6 metres per second the maximum short-term pollution will be 450 microgrammes SO_2 per cubic

metre and for a wind speed of 14 m/sec the pollution will be $750 \mu\text{g}/\text{m}^3$. The distances downwind from the chimney of these areas of maximum pollution are given by the calculation as 10 and 5 kilometres respectively but the more modern ideas outlined in the last paragraph would make these distances rather less. But in any case, as the wind speed increases the maximum short-term concentration increases and the point of maximum pollution moves nearer to the chimney. The area of maximum pollution is small and at any point the duration of maximum pollution is limited to a few minutes. The pollution contours run in long narrow ellipses and their positions is constantly moving in accordance with variations of wind speed and direction, and atmospheric turbulence. The average pollution over, say, a month or a year, would be at least 30 times less than the short term values quoted above.

Perhaps the best justification of the above calculations is the agreement of theory with observation for two existing power stations, one a 1,000 megawatt coal-fired station. Here the Central Electricity Generating Board detected short-period concentrations of sulphur dioxide, persisting for 2 to 3 minutes, of up to $1,250 \mu\text{g}/\text{m}^3$ where calculation gave 1,000 and $800 \mu\text{g}/\text{m}^3$, again subject to an error of a factor of 2 either way.

Another, rather general, way of examining how it is possible to increase the size of power stations without increasing pollution from them at ground level has been suggested by Stone and Clarke, Proc. National Society for Clean Air Conference 1963, p. 117. In all the formulae for the maximum ground-level concentration of a pollutant, the only factor dependent on the power station is Q/H^2 , where Q is the rate of emission of pollutant and H is the effective chimney height, that is the actual chimney height plus the thermal rise. Since, therefore, the meteorological variables can be taken as constant when comparing one power station with another, the factor Q/H^2 can

be used as an index of the pollution that can be expected at ground level without all the qualifications that are necessary when absolute values are calculated. Using the Bosanquet formula to give the thermal rise, the following table was calculated:

Power Station	Capacity Capacity (megawatts)	Q/H^2 (arbitrary units)
Bold "A"	128	16.4
Drakelow "A"	244	14.3
Ferrybridge "B"	300	11.3
Blyth "A"	480	21.0
Northfleet	720	17.0
High Marnham	1,000	15.1
Eggborough	2,000	16.4

Thus with proper design of chimneys it has been possible to achieve a fifteen-fold increase in the capacity of a station without increasing the calculated ground-level concentration of sulphur dioxide appreciably.

The calculations up to now refer to normal atmospheric conditions. Two freak meteorological conditions are however of very great interest. The first is that of high wind and great atmospheric turbulence when the plume may be brought down to the ground in puffs near the chimney. It is considered that since these are the conditions when pollution from other sources is low, any danger to health should be small. On the other hand, in periods of temperature inversion, usually with anti-cyclonic conditions, calm or near calm, and fog, when pollution from low level sources is at its highest, the hot buoyant plumes from the high chimneys of power stations should have a maximum thermal rise, and so penetrate the inversion and contribute nothing to the pollution beneath it. This view is again based on theoretical calculations backed up by practical observations such as those made from

aircraft flying above the top of the fog. The power station plumes could be seen rising through the fog and dispersing normally in the air above it.

As stated previously there are no legal regulations in the United Kingdom on the maximum ground-level concentrations of pollutants that must not be exceeded, and each case is judged on its merits. Comparing the calculated concentrations, as given above, with the average concentration of sulphur dioxide in an industrial town, and with the peak concentrations concealed in this average, and taking into account what little is known about the effects of pollution on health, it would be difficult to contend that the 2,000 megawatt power station under consideration would cause harmful pollution. The Inspectors of the Ministries who conducted the Public Enquiry took this view and the plans were passed. At about the same time the plans for another such station which it was estimated would give rise to concentrations of sulphur dioxide nearly twice as great as those just referred to, were also passed.

Doubts as to how far modern tall chimneys may be successful in keeping the air reasonably pure begin to come in when the power station is considered in its industrial context. To begin with, if the 1 per cent sulphur coal were replaced by residual fuel oil of a type commonly used, with 4 per cent of sulphur, all the concentrations given would be nearly doubled. It should be added, in parenthesis, that a sulphur content of 1 per cent for coal is exceptionally low, and future large power stations in the U.K. will probably have to use coal with 1.5 to 2.0 per cent sulphur. If many power stations or giant industrial installations were concentrated in any one area, the frequency of high concentrations would be greatly increased, as well as the average ground level concentration, and if this concentration of industry were in a valley the observed concentrations will be vastly in excess of those calculated for a plain. A vivid example of this

is the concentration of industry in Northern Bohemia, in Czechoslovakia, which is killing the forest trees on the mountains miles away.

(The paper continues by discussing methods for the removal of sulphur dioxide from flue gases).

Solid Fuel Conference in Brighton

A conference, well-attended by representatives of women's organizations in the area, was recently held at the N.C.B. Housewarming Centre in Brighton. The conference was organized by the South Eastern Region of the Women's Advisory Council on Solid Fuel, and before and after a buffet lunch talks were given by Dr. W. A. O. Herald, Principal of the Coal Utilization Council Training Centre, on Small Bore Central Heating, and by Mr. Arnold Marsh, of the National Society for Clean Air, on the Clean Air Act. Delegates had an opportunity of inspecting this new and impressively equipped centre.

Demolition Dust

A Birmingham shopkeeper-councillor is to ask the city council to seek legislation to control dust from demolition sites.

Councillor Charles Collette, a city centre retailer, claims there is a health hazard in the disturbance of centuries-old dust, as well as being a nuisance to shopkeepers.

A spokesman for a specialist firm of demolition contractors commented that Birmingham Corporation insisted the buildings on its own demolition sites should be shrouded with dust sheets.

But it could cost up to £2,000 to encircle a building completely with polythene sheets.—*Grocers Gazette*.

The September issue of *Housing*, the journal of the Institute of Housing Managers, contains an informative and timely article on Smoke Control, by James Goodfellow, Chairman of the N.S.C.A. The information given about the making of a smoke control area, and about smokeless fuels, should be of much practical help and interest to housing managers.



The Horticultural Hall, Westminster, was the scene, in October last, of the largest yet exhibition of solid fuel domestic appliances and systems. Organized by the N.C.B., with the full co-operation of the appliance industry, its comprehensiveness was well matched by the skilful and attractive display. The photograph shows the approach to a fully-equipped model bungalow

FUEL POLICY AND CLEAN AIR

Fuel Policy. Ministry of Power, Cmnd. 2798. pp. 35. H.M.S.O., 3s. net. Questions on Fuel Policy. Political and Economic Planning (P.E.P.), pp. 28, 6s. (from P.E.P. Despatch Dept., 98 Kingston Road, London S.W.19).

The purpose of the White Paper, says the introduction, "is to describe, with the necessary background, the principles which should govern a co-ordinated national fuel policy and the machinery and measures whereby the Government proposes to secure and maintain such a policy."

The White Paper should be read in this light, as a description of principles, and not a statement of policy. Correctly viewed, it is a useful survey of the fuel situation and of the many problems and considerations that must be taken into account in attempting to formulate a fuel policy. The objectives of such a policy are outlined, and sources of energy are discussed in the headings of coal, oil and nuclear power, as the primary fuels, with gas and electricity as secondary fuels.

It is tempting to mention and comment upon many of the aspects of fuel policy that have only an indirect bearing on clean air policy, but it is more important to refer to one or two paragraphs that concern clean air more directly. One of these is a paragraph on "Fuel Supplies for Clean Air", which describes the decline in the production of gas coke and the expectation that this will be made up by "substantial increases" in the production of open grate fuels by both the National Coal Board and private producers. The availability of hard coke for closed appliances is expected to be increased, and "there are plentiful supplies of non-solid smokeless fuels—gas, off-peak electricity and oil". "All these", it is said, "together should be fully sufficient to maintain progress with the clean air policy."

Fuel policy is often loosely regarded as a means for encouraging or

requiring restriction on consumer freedom of choice. Such freedom is, however, regarded as being desirable in itself, and is given as one of the objectives of a fuel policy. The principle is, of course, denied in part by the clean air policy, and in other ways, too, it may be eroded. Thus reference is made to the discouragement of direct heating by electricity, which it is thought (para. 90, 95 and 96) may best be attained by devising new types of tariffs that would both discourage direct heating and encourage off-peak uses. (It is difficult to envisage a tariff that would penalize direct heating without interfering with uses of electricity that cannot be criticized—such as washing machines and vacuum cleaners, as well as radio and television).

The White Paper's view that coal consumption must be expected to decline to 170 to 180 million tons by 1970, is hotly disputed by Lord Robens, Chairman of the National Coal Board. He has said, very firmly indeed, that the industry intends to reach 200 million tons per annum. That there should be such a difference in forecasting is not only intriguing, but is an example of the inherent difficulties in looking into the future in this ever-changing field, and therefore of setting out a firm and definite fuel policy.

One of the main conclusions of the White Paper is stated thus:

"Much of the background to fuel policy which is set out in this White Paper changes little from year to year. The national interests which fuel policy must seek to serve, and certain basic characteristics of the various fuel industries, change slowly if at all. But in other respects circumstances are never constant. This is an area markedly subject to technological innovation, and the research and development efforts of the industries are continually opening up new opportunities and presenting new problems. New sources of fuel supplies are being discovered and the balance of costs between different fuels is

continually changing. These changes affect the relationships between the various industries and the way the interests of each industry conflict or harmonize with those of the others. They also affect the nature and scale of the very heavy capital investment undertaken by the industries."

This gives support to the view expressed in an editorial in this journal six months ago: "Unless a national fuel policy recognizes the changing nature of the fuel pattern, and has its own built-in capability for change, it could do more harm than good."

The P.E.P. broadsheet on "Questions of Fuel Policy" (issued in June) is a forerunner of a full scale report on fuel policy that may have been published by the time this review appears. It is a statement of the situation that possesses the calm objectiveness one expects from P.E.P., and in many ways supplements the White Paper.

The main problem to be considered by any minister formulating a national fuel policy, it is stated, is protection

for British coal against oil. But how much protection and in what form? This is discussed at some length and the conclusion that is reached is that the arguments for long-term protection are not very convincing, but that there is a stronger case for short-term protection. The important, and unresolved, factors behind all examination of the future are the possibilities of cheap nuclear power and of natural gas.

A short section of the broadsheet is headed "Problems for Policy-making", which is a series of practical questions for which answers are necessary before a fuel policy can be laid down. One of these questions is:

"How far should the gas and coal industries be obliged to keep their investment policies in line with the Government's forecasts of solid and other smokeless fuel requirements arising from application of clean air policy?"

The report includes a statistical appendix of six useful tables. We look forward to seeing the full report that is to be published.



At the Eastbourne conference—during the interval at the Civic Concert the Mayor, Councillor Mrs. Underhay, presents the Golf Trophy to the winner, Mr. W. Gilchrist of Batley, with Mr. James Goodfellow, Chairman of the Executive Council, showing his appreciation of the occasion

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Well, they like to be informed on all systems. But they increasingly choose the newest electric central heating... **ELECTRICAIRE**

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**Electrical Development Association (M/SA/4),
Trafalgar Buildings, 1 Charing Cross, London, S.W.1.**

SMOKE CONTROL AREAS

Progress Report

POSITION TO 1 OCTOBER, 1965—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,693	58
<i>Acres</i>	388,287	21,848
<i>Premises</i>	2,148,064	136,652
Smoke Control Orders		
Confirmed	178	13
Submitted	95	4
Grand Totals	2,010	76

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Autumn, 1965) which gave the position up to 1 July, 1965. They now show the changes and additions to 1 October, 1965.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

New Smoke Control areas in operation

Northern

Tyneside and Wearside

Jarrow B. No. 3, Newburn U.D. No. 3,

Thornaby-on-Tees B. No. 2.

Yorkshire

West Riding (North)

Baildon U.D. No. 2, Horbury U.D. No. 2, Huddersfield C.B. Nos. 8, 9, Keighley B. No. 5, Leeds C.B. Nos. 4, 6, Mirfield U.D. No. 6, Morley B. No. 22.

West Riding (South)

Sheffield C.B. No. 14.

North Western

South Lancashire and North East Cheshire

Atherton U.D. No. 2, Bury C.B. No. 5, Kearsley U.D. No. 1, Manchester C.B. Nos. 11, 12, 13, Rochdale C.B. No. 6, Sale B. No. 5, Salford C.B. No. 7, Urmston U.D. No. 3, Whitefield U.D. No. 7 (their No. 5A).

Central Lancashire

Burnley C.B. No. 6, Colne B. No. 4.

Midlands

Derby, Nottingham and Chesterfield

Beeston and Stapleford U.D. Nos. 6, 7, (their No. 3A).

West Midlands

Coventry C.B. No. 7, West Bromwich C.B. No. 14.

Potteries

Newcastle-under-Lyme B. No. 4.

London

Greater London Council

Acton B. Nos. 10, 11, Beddington and Wallington B. No. 5, Camberwell M.B. No. 6 (their No. 5), Carshalton U.D. No. 5, Dartford B. Nos. 7, 8, (their No. 5), Ealing B. Nos. 19, 20, East Barnet U.D. No. 6, Finsbury M.B. No. 5, Fulham M.B. No. 9, Hackney M.B. No. 9, Hayes and Harlington U.D. Nos. 2, 4, Heston and Isleworth B. No. 9, Ilford B. No. 6, Kensington M.B. No. 8, Kingston-on-Thames B. No. 5, Lewisham M.B. Nos. 18, 19, Merton and Morden U.D. No. 3, Richmond

(Surrey) B. No. 6, St. Marylebone M.B. No. 8, St. Pancras M.B. No. 6, Shore-ditch M.B. No. 7, Twickenham B. No. 4, Wanstead and Woodford B. No. 6, West Ham C.B. No. 2, Woolwich M.B. No. 1.

Local Authorities outside the Black Areas

Barnet U.D. No. 6, Basildon U.D. No. 3, Brentwood U.D. No. 4, Crawley U.D. No. 5, Exeter C.B. No. 8, Hemel Hempstead B. Nos. 4, 5, Luton C.B. No. 3, Reading C.B. No. 9, Thurrock U.D. No. 3, Whitley Bay B. No. 1.

New Orders Confirmed but not yet in Operation

Northern

Tyneside and Wearside

Jarrow B. (No. 4) Wear Street, Newburn U.D. No. 6 (South Denton), Newcastle-upon-Tyne C.B. No. 10.

Teeside

*Billingham U.D. No. 3, Darlington R.D. No. 1.

Yorkshire

West Riding (North)

Aireborough U.D. No. 18, *Bradford C.B. (Allerton), Leeds C.B. No. 51, Moortown (Meanwood Park), Morley B. Nos. 30, 31, (32), Queensbury and Shelf U.D. No. 5, Stanley U.D. (South Stanley No. 1).

West Riding (South)

Rotherham C.B., Wickersley Road No. 3, Sheffield C.B. No. 16, Swinton U.D. No. 9.

North Western

South Lancashire and North-East Cheshire

Eccles B. No. 6, Heywood B. No. 5, Manchester C.B. (Didsbury), Sale B. No. 6, Salford C.B. No. 11, Stalybridge B. (Buckton Vale Road), Swinton and Pendlebury B. No. 4, Worsley U.D. (Armitage Estate and Part Hulton E. Ward).

Merseyside

Birkenhead C.B. Nos. 13, 14, Liverpool C.B. No. 18, Widnes B. No. 5.

Midlands

Derby, Nottingham and Chesterfield

*Arnold U.D. (No. 1), Derby C.B. (No. 7) (Dale).

West Midlands

Dudley C.B. (Spring Parklands), Hale-sowen B. Nos. 24, 26, *Stourbridge B. No. 20.

Greater London Council

Barking B. Nos. 9, 10, Ealing B. No. 20 (No. 22), *Finchley B. No. 10, L.B. of Hammersmith (No. 8), Hendon B. No. 13, Ilford B. No. 7, L.B. of Islington

(Nos. 20, 21, 22), Merton and Morden U.D. No. 7, Poplar M.B. No. 16, L.B. of Redbridge No. 7 (Fairlop), L.B. of Redbridge No. 8 (Hainault).

Local Authorities outside the Black Areas

*Burton-upon-Trent No. 1, Chatham B. No. 1, *Exeter C.B. (Cowick Lane No. 2), Harlow U.D. No. 5, Rugby B. No. 1, Stanley U.D. No. 2 (Co. Durham), Todmorden B. No. 4.

New Orders Submitted for Confirmation but not yet Confirmed

Northern

Tyneside and Wearside

Gateshead C.B. (Saltmeadows) No. 8.

Teeside

West Hartlepool C.B. No. 3.

Yorkshire

West Riding (North)

Halifax C.B. No. 12 (Copley), Heckmondwike U.D. No. 5, Ossett B. No. 8.

West Riding (South)

Swinton U.D. No. 11.

North Western

South Lancashire and North-East Cheshire

Audenshaw U.D. No. 4, Denton U.D. No. 11, Manchester C.B. (Radnor Street, Hulme), Stretford B. (Area No. 8).

Merseyside

Bootle C.B. No. 7, St. Helens C.B. No. 1.

Midlands

Derby, Nottingham and Chesterfield

Chesterfield R.D. No. 6.

West Midlands

Aldridge U.D. Nos. 22, 23, Birmingham C.B. (No. 99), West Bromwich C.B. No. 15.

London

Greater London Council

Havering L.B. (No. 1), Islington L.B. (Area No. 23), Kingston-upon-Thames L.B. No. 7, 6, and 8, L.B. Redbridge No. 10, L.B. Richmond-upon-Thames (Twickenham No. 5), L.B. Richmond-upon-Thames No. 7.

Local Authorities outside the Black Areas

Brentwood U.D. (No. 5), Cambridge C.B. (No. 2), Exeter C.B. (Pines Hill), (Salmon Pool Lane), (Stoke Hill No. 1), Glanford Brigg R.D. (Bottesford, Burringham, Flixborough and Gunness), Skelmersdale U.D. No. 1, Southampton C.B. No. 4.

SCOTLAND

New Orders in Operation

Dundee (Downfield West), Glasgow (Craigton), East Kilbride (Murray) East Kilbride (St. Leonards), Motherwell (Lodge and Paterson Street), Paisley

(George Street), Paisley (Espedair),
Rutherglen (Fernhill).

New Orders Confirmed but not yet in
Operation
Falkirk No. 4.

New Orders Submitted but not yet Con-
firmed

Edinburgh (Murrayfield—Cramond)
No. 1, Paisley (Thornly Park/Lochfield)
No. 6.

Summary of Smoke Control Progress

As at 30th September, 1965

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders con- firmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern	17,330	13.8	80,300	14.5
East and West Ridings	88,995	23.6	318,400	27.3
North Midlands ..	19,925	7.4	74,640	14.6
Greater London ..	142,030	43.4	1,289,540	48.9
North Western ..	93,010	23.2	410,530	24.1
Midlands	44,665	18.0	211,765	20.1
South Western ..	5,050	19.2	18,105	12.2
Wales and Monmouthshire	45	0.01	755	0.2
Totals	411,050	19.5	2,404,035	29.3

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (e.g. there may be some areas of open country).

Greenhouse Smoke Case

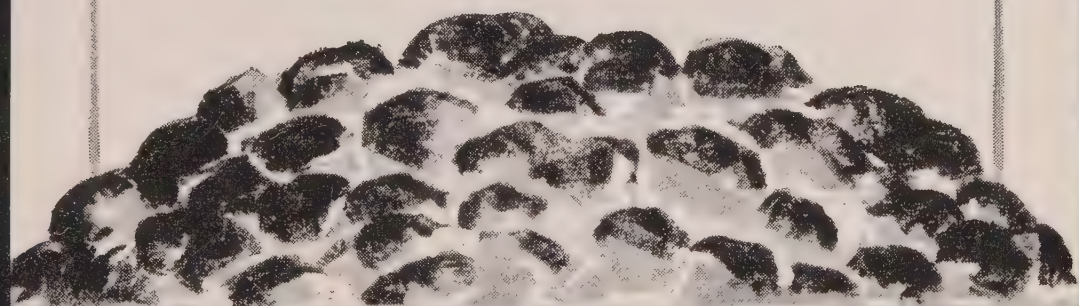
In a case at Nottingham on 29 October damages and an injunction were sought by a Mr. and Mrs. Willett, of Brinsley, against a neighbour, Mr. L. T. Pass, on the ground that smoke from a greenhouse chimney was such that washing was dirtied as it dried, soot deposits appeared on windows, shrubs withered, and breathing was affected. This nuisance, it was said, had been experienced over a period of three years.

The defendant, a retired policeman, said he used his large greenhouse for

tomatoes and chrysanthemums. In February of this year he had begun to use smokeless fuel. Before that the chimney had smoked from ten to twelve minutes after firing. He used to sweep the chimney every four days. He now intended to stick to smokeless fuel.

Judge A. T. Flint awarded £25 damages and costs to Mr. and Mrs. Willett, but refused an injunction on an understanding from Mr. Pass that he would burn only smokeless fuel. He was quite satisfied that there had been a nuisance but that it had ceased.

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News from the Divisions

North West

The active Publicity Sub-Committee of the Division met on 5 October and decided that the publicity material available from the headquarters of the Society was not wholly suitable for the north west. The Committee felt that any publicity used to promote clean air in the north west must be in accord with the *local* record of establishment of "clean" areas and emphasized the particular local authorities' past and future programme.

The Sub-Committee has representatives from all the nationalized fuel industries in the north west and representatives from the Manchester and District Regional Clean Air Council, the South West of Manchester Region of the Standing Conference and the South East Lancashire and North Cheshire Consultative Committee for the Investigation of Atmospheric Pollution.

It was reported at the meeting that the Division had been unable to participate in either the Fuel and Efficiency Exhibition or the Domestic Heating Exhibition because of lack of funds. This meant that the Society had not been represented at any exhibition in Manchester in 1965.

West Midlands

On Wednesday, 22 September, 30 members from the Division attended a successful meeting at the Coalbrookdale Works of Allied Ironfounders Limited. The meeting was followed by a tour of the Works after which members were entertained to lunch by Allied Ironfounders Limited.

The afternoon was devoted to a tour of the Museum in the Coalbrookdale Works and here members were able to

absorb the history from the charcoal burning days which began in 1709. The highlights of the historic section included the remains of a water wheel pit, a nineteenth-century grindstone, a fountain made for the Great Exhibition of 1851 and an old furnace which could be termed one of the very foundations of the Industrial Revolution.

The tour of the Museum also provided an opportunity to see the first cast-iron rails in the world, produced and used extensively by the Coalbrookdale Works from 1767 onwards, the new furnace built about 1792 but never brought into use, the great warehouse built about 1792, with a clock tower added in 1843 and many structural features of cast-iron. The Coalbrookdale Works has been part of the Allied Ironfounders Group since 1929 and members were reminded that pioneer kinds of stoves and smokeless fuel grates had been developed and made there since the mid-19th-century.

South-West

On 14 October, 1965, members of the South West Division of the National Society for Clean Air were shown at Berkeley Nuclear Power Station how the Central Electricity Generating Board produce more than half the power generated in the region from atomic energy without appreciable air pollution, thus contributing materially to the preservation of clean air in the west.

Earlier the Bristol and West Clean Air Committee which, led by the late Mr. F. J. Redstone of Bristol, had for many years pioneered the cause of Clean Air in the west, had resolved to



Members of the new South-West Division at the Berkeley Nuclear Power Station

become the Northern Area Committee of the South-West Division of the National Society for Clean Air.

It appointed to its Executive representatives of local authorities and of the various fuel industries, as well as officers concerned with air pollution, including medical officers, public health inspectors, an Alkali Works Inspector, a Public Analyst and a City Architect. They did not forget to include a housewife, who is a private member, and wanted to co-opt a planning officer to complete their panel of experts. "We are in danger of planning too little and too late to prevent air pollution", said Councillor Captain D. O. C. Maggs of Shaftesbury R.D.C.

Alderman G. P. C. Ford of Bristol, was re-elected Chairman of the Northern Area Committee and Councillor W. H. England of Bristol, Vice-Chairman. Mr. G. J. Creech, Chief Public Health Inspector of Bristol, succeeded Mr. R. V. Redston of Bath as Honorary Secretary, Mr. G. W. Dhenin, Deputy Chief Public Health Inspector of Bath, continuing as Assistant Honorary Secretary.

Members were welcomed to the power station by its Superintendent,

Mr. F. R. R. Jones, B.SC., ENG., A.M.I.E.E., A.M.I.MEC.E., and given a general description of the works by Mr. Grimshaw.

The Station Health Physicist, Mr. E. Lewis, B.SC., A.INST.P., then spoke on "Atmospheric Effluent Disposal from Nuclear Power Stations", after which members were taken on a tour of the station.

New British Standards

The British Standards Institution announce that a complete revision of the B.S. 1756 series of standard *Methods for the sampling and analysis of flue gases* is now available, following the recent publication of the revised Part 3, which covers *Analysis by the Haldane Apparatus*.

Part 4 of B.S. 1016, on *Moisture, volatile matter and ash in the analysis sample of coke* has also been revised and published. A revision of Part 3 of the same B.S. has also been published, on *Proximate analysis of coal*. The prices of the three standards are 10s., 6s., and 7s. 6d., excluding postage, from B.S.I. Sales Branch, 2 Park Street, London W.1.

Education and Publicity for Clean Air

Arnold Marsh, O.B.E., M.Sc.Tech., F.Inst.F.

A Paper presented at the Reinhaltung der Luft Congress at Dusseldorf in April, and at the Argentine Clean Air Conference at Buenos Aires in November. The paper was first published, in German, in the November 1965 issue of "Staub und Reinhaltung der Luft".

AS this paper must of necessity be based on experience in Britain in education and publicity for the promotion of clean air, it may begin with a brief description of the problem in that country. In some respects this is the same as in any other industrialized country, but in other respects it is peculiar to ourselves. This is mainly because of the difficult problem arising from the domestic burning of bituminous coal in open fires.

Britain has the doubtful distinction of being the first country to have a serious and general air pollution problem. This is because our limited amount of forest led to a scarcity of wood fuel and charcoal as early as the 14th century, a scarcity which was met by a steadily increasing use of coal, ultimately making possible the industrial revolution of the 19th century. If coal had not been so abundantly available Britain would have remained a sparsely populated agricultural country.

Coal, for many centuries sent by sea from the north-east of England to London, was first used for manufacturing purposes only, but later had to be accepted in the home, where it was burned in grates on the open hearths previously used for wood. Although we need heat in our homes for seven or eight months in the year, it was probably our milder climate, compared with continental Europe, that prevented the evolution of the more efficient closed stove. The gross inefficiency of the open hearth was regarded as being offset by the cheerfulness of flame and direct

radiant heat. We have thus been left with a legacy and tradition, largely sentimental, in favour of the open fire.

Parallel with the early use of bituminous coal in the home there was the early industrialization of the country, with coal being used in the prototypes of manufacturing plant of all kinds. With little or no knowledge of the principles of combustion, heavy smoke emissions were inevitable and came to be regarded as a natural concomitant of industrial progress. There was, in the north, a saying that "where there's muck (dirt) there's money"—a belief that is not entirely dead even today.

Assailed, even before the beginning of the technological era, by air pollution from both manufacture and the homes of the people, complaints about the nuisance are recorded from very early days. A royal ordinance of 1273 sought to prohibit the use of coal in London, and the first pamphlet attacking air pollution and making proposals for clean air in the metropolis was published in 1661.¹ The first of a series of government committees of inquiry into the problem was made in 1819, and the first legislation to control industrial smoke was passed in 1843. Later laws sought to improve control over pollution from industry, but it was not until 1956 that we secured the present Clean Air Act, which followed the recommendations of a Government inquiry (the "Beaver Committee") set up after the disastrous London smog (smoke-fog) of 1952, which caused 4,000 deaths.²

The Act deals with domestic smoke as well as smoke, dust and grit from industrial sources. Chemical fumes and noxious gases are controlled under other legislation—The Alkali &c. Works Acts and Regulations. This latter legislation, which is administered by a department of the central government, has just attained its centenary, and is probably the world's oldest organization for air pollution control.³ The third serious form of air pollution, from road vehicle exhaust emissions, is controlled separately, under a Road Traffic Act and Regulations.⁴

The Growth of the Society

If addiction to primitive forms of heating in their homes is a failing of the British people, a more commendable custom is that when a social problem of any kind appears it is quickly followed by a banding together of individuals who feel strongly about the matter. They form associations to combat the evil by moral pressures or by seeking to secure legislation to control it. There are numerous associations and societies of this kind, seeking reforms over a wide social spectrum. Some remain small and weak, and some have become large and influential. They rely, in the main, on voluntary contributions and, to begin with at any rate, rarely enjoy official support. They may begin by being regarded by the public at large (and by officialdom) as bands of eccentrics, but if their case is good and their propaganda sound, they may win public opinion to their views and finally achieve their objects.

This was the case with the problem of air pollution. As the problem grew, and reached its peak towards the end of the 19th century, its evil consequences were recognized by the more enlightened, or more perceptive, few. A National Smoke Abatement Institution was set up in 1882, but did not survive for long. Then, in 1899, a Coal Smoke Abatement Society was formed, beginning with a mere handful of people meeting in the home of a

London physician. It is from that body that the present National Society for Clean Air is directly descended.

The task the early pioneers set themselves was difficult. Coal was relatively cheap, and the idea of fuel efficiency, and with it smoke prevention, hardly existed. On the domestic side there must have seemed little prospect of abolishing the open coal fire. Public opinion, from government circles downwards, was completely apathetic and regarded smoke abatement as idealistic and quite impracticable. The main objects of the Society were, therefore, to make known the harmful effects of air pollution so that preventive action could be sought, to secure the better enforcement of the limited legislation that did exist, and to encourage anything that might help to reduce the domestic pollution.

In 1912, it is interesting to note, the Society held the first International Conference and Exhibition in London.

As the years went by the Society became more influential and, although its resources were too small to make much direct impact upon public opinion, it began by degrees to convince the scientists, technologists, medical authorities and the more progressive industrialists, that air pollution was a serious problem which called for more vigorous action. Belittlement and opposition, or complete lack of concern, was the attitude of the great majority of industrialists. The local authorities (municipalities), who were mainly responsible for administering the law, though many failed to do so, came gradually to recognize their responsibilities. Today they form a large proportion of the Society's membership and its governing council.

The achievement of cleaner air was of course made progressively easier—especially during the last two decades—by the advances in fuel technology that make possible the elimination of industrial smoke, the reduction of grit and dust emissions, and more effective control over fumes and noxious gases; while on the domestic side the progress

towards the abolition of the open coal fire has been made possible by the development of new and smokeless forms of heating, using solid smokeless fuels, gas, electricity or oil. The drive for clean air and the advancement of these new methods on their own merits have greatly assisted each other.

The Principals Involved

With this background it becomes possible to look at the work of the education and publicity—or propaganda—that has helped to promote the progress that has been made. To seek to describe this in general terms might suggest the existence of a long-term plan, based on carefully considered principles. This, however, is not the case, and from its beginning the campaign for clean air has been of an empirical nature. Opportunities for advancing the cause have been taken as they occurred, and according to the means available. (Unfortunately, the all-important financial means have always been extremely limited.) Nevertheless, if we look at the history of the movement adherence to some simple principles become apparent. These may be discussed individually.

Mass and Selective Publicity—It must be admitted that the need for creating a favourable mass public opinion is especially important to us in Britain, because the public are directly affected by the programme that is now in progress for the abolition of the open coal fire through the progressive establishment of smokeless zones. This need may be less apparent and less urgent in other countries, but nevertheless it is believed that in any country or city where air pollution is a problem it is desirable to secure the interest and support of the public, even if only for the purpose of helping to secure effective control regulations or standards and their efficient administration. The support of public opinion is also needed, in almost every country in the world, to meet the growing menace of air

pollution from road vehicles. This pollution affects both the users of motor vehicles and pedestrians alike to an extent that is perhaps not fully understood. Effective control may not be welcome to vehicle users and may for instance involve wider prohibition of motor traffic in shopping and recreational areas. Considerable educational publicity may be called for.

Mass publicity campaigns for the direct creation of a favourable public opinion can be considered only if ample funds are available to permit expenditure comparable with commercial advertising and government propaganda campaigns. Not only must the impact made be considerable, but it must be reiterated over a possibly lengthy period. Except in the ways mentioned below it is generally desirable not to embark on widespread but weak mass publicity, but rather to concentrate what funds are available on more restricted, carefully chosen, and selective efforts.

Low Cost Mass Publicity—Despite what has just been said, there are certain ways in which a direct approach can be made to the public, or to sections of the public, that can be carried out at low cost. Most important of all, there is publicity in the Press, and on radio and television, provided always that suitable news and information of interest can be provided. It means the provision of news material of an acceptable nature in an acceptable form, and at the right time. It is a method that the N.S.C.A. has concentrated upon, not without success. For its annual conferences, for example, 400 or more press reports are customary, many of them being published in advance of the meetings. Not only do these reports appear as news items in the daily newspapers, but considerable attention is secured in the periodical press, such as the technical, trade and professional journals. A feature of British newspapers is the publication of letters from readers, in which questions of all kinds are discussed, sometimes with heat. This provides another

channel for clean air publicity, especially in meeting any criticism, and many letters from the Society are written to the newspapers. This is a form of publicity that costs nothing but the time expended in writing.

Selective Education and Publicity—This is the line the British movement has followed in practice. It means that effort should be directed towards the small groups of persons who themselves are the creators and leaders of public opinion. Such groups include the members and officials of central and local government bodies; industrial leaders and particularly fuel technologists; health and medical groups; teachers and students; women's organizations, and so on. Such publicity can be achieved in numerous ways, and can be comparatively inexpensive, though it may involve the production of specialized publications, the organization of meetings, the showing of films, and the organization of special displays and exhibitions.

If, by such selective publicity, the interest of other bodies is secured, such as in particular the local authorities (municipalities) they will themselves be able directly to promote public opinion in their own areas, for which educational and publicity material, such as leaflets, posters and exhibits, will be called for and should be made available. The N.S.C.A. has just produced, for example, a wall-chart for use in schools, with a specially prepared booklet of notes for teachers for use in talks to the children.

Films are of course an important medium for education and publicity. Their production is, however, costly, especially for popular films intended for the general public, which invite comparison with expensive commercial productions. In Britain we have had the benefit in recent years of first-class clean air films produced by the gas and oil industries, which have been commendable because they have not sought to promote the special interests of their sponsors.

The Promotion of Discussion—The first objective in air pollution education is to make those to whom it is directed—the selected groups or the public generally—aware of the existence of the problem, convinced of its harmful effects, and in favour of the action that is necessary to control or prevent it. The next stage is likely to be to publicize the action that is proposed, which stimulates discussion, or even controversy, and thereby further publicizes the problem. This will help to secure acceptance of the measures required. Then, when they have been adopted, further discussion should be promoted among those who may be affected by them, so that they will be understood and complied with.

In Britain, for example, the passing of the important Clean Air Act in 1956 was followed by a considerable number of meetings and conferences, especially in local government organizations, and technological and industrial associations. The terms of the Act, and how they were to be met, were widely and fully discussed. This process continues, and even now the annual conferences and other meetings of the N.S.C.A. are largely devoted to papers and discussions on the administration of the Act, and perhaps to consideration of any weaknesses, difficulties, and ways of improvement. These are practical discussions, of value in themselves, and also having a further value in the publicity they frequently generate.

The Nature of the Publicity—It is not possible to discuss the forms and nature of education and publicity in any detail, for the field that may be covered is very large, and publicity must usually be concentrated on specific aspects and must be designed for the particular group to which it is directed. A review of the health aspects of air pollution will, for example, vary considerably according to whether it is intended for, say, schoolchildren, members of municipal councils, or medical associations.

The example illustrates one im-

portant principle that we have always sought to adhere to. That is, all material must be accurate and free from exaggeration. On the health side in particular there is the danger of striving to make a stronger impact by indulging in statements that are more emphatic or sensational than is warranted by the facts. Such propaganda may give useful temporary results, but may alienate the more knowledgeable or more sceptical, and in the long run will do more harm than good.

The need for veracity need not, however, prevent the judicious use of humour and of imaginative symbols or allusions. One of the N.S.C.A.'s most successful posters is, for example, a picture of a comical looking business man whose lungs are filling with smog, with the slogan "Clean Air is Your Affair". Another shows a sad-looking face, capped with smoking chimneys instead of hair, and the slogan "Britain's Biggest Headache—Smoke".

Many aspects of the case against air pollution lend themselves to simple graphic pictorialization, and as an example may be cited a chart showing a series of plants, with their sizes varying in direct ratio with the sootfall in the areas in which they were grown. This is based on data from an early and important investigation on the effects of pollution upon plant life,⁵ which expressed in simple pictorial terms is very effective.

The Importance of Quality—A voluntary association with very limited funds, attempting to advance its cause as effectively and convincingly as it believes it can, both to the general public and to the special groups, has a difficult task. It has to compete for attention with wealthy commercial, political and other interests, deploying far greater resources and being able to make full use of all the aids to persuasion that modern advertising techniques can provide. It is therefore essential that what publicity can be undertaken by a comparatively poor organization should be, within its

limits, of high standard. It must be able to stand comparison with commercial publicity in respect of *quality*, if not quantity and expensiveness. Quality can be combined with simplicity, and need not be unduly costly. It is better to put out a smaller quantity of good quality publicity than a larger amount of material that will be looked upon as second-rate.

Technical Publicity—In case too much emphasis appears to have been placed on education and publicity directed to the public or to non-technical groups, it must be added that in Britain we have also given much attention to the need for activities directed to specific groups by means that are essentially educational even though they may not be recognized as such. Such activities may not be given much publicity, and they may reach only small groups of persons, but they may be most important. Papers and lectures to professional and technical associations, articles in specialist periodicals, and the publication of technical or semi-technical reports, are among the means that may be used. One specialized and directly educational work, initiated by the Society nearly sixty years ago, has been the organization of classes of instruction, and the holding of examinations and the issue of diplomas, for boiler and furnace operators or stokers.

One example from our recent experience may be regarded as a combination of technology, publicity, education and administration. This is the study of the problem of smoke emission from diesel-engined road vehicles by the Technical Committee of the N.S.C.A., from which proposals for control have been embodied in memoranda and recommendations submitted to the Ministry of Transport. These memoranda have been discussed at conferences and sent to and considered by organizations concerned with road transport. The impact upon the general public may have been small, but we believe that they have been of educational value to

those responsible for the emissions, have directed attention to the essential technical aspects of the problem, and have been useful to the Ministry in the development of a control policy it is now operating.

Another, very recent, example, is a study of the problems of sulphur dioxide emission. In Britain there was some criticism of the Clean Air Act on the ground that it does nothing to control the emission of sulphur dioxide. There has been a view that if enough effort is made a method of sulphur dioxide prevention must be found. The criticism is illogical, because to have deferred smoke and grit prevention measures until such time as sulphur dioxide could also be prevented, is clearly absurd. Further, it is unlikely that there could be any one or simple "solution" to what is a complex problem. Because of the confused thought that was apparent the Technical Committee of the N.S.C.A. made an analytical study of the problem. Its report showed that there are no evident prospects of completely eliminating sulphur dioxide, that some reductions of its emission should be possible, that its harmful consequences may be lessened and that the measures required for smoke prevention are in fact helping to reduce both emissions and immissions (ground level concentrations).

The report⁶ was prepared in a semi-technical form, was discussed at the Society's annual conference, and has been widely reported and reviewed in both the daily newspapers and in the scientific and technical journals. It is felt that it has done much to clarify a difficult problem and has therefore had a most useful educational effect.

This report may be compared with a recent West German report on sulphur dioxide by Spengler and Michalczyk, published by the V.D.I.⁷ This is an important scientific and fully documented contribution to the technical literature on air pollution, quite different in purpose and content to the small British report. Essentially, it is a document for those who are

working on and fully understand the problem; our own is essentially an educational publication for those who are *not* working on the subject and who have hitherto not understood it.

In a similar way the quarterly journal of our Society in Britain, *SMOKELESS AIR*, may be regarded as a semi-technical publication, in part at least educational and seeking to promote publicity. It is in fact a dual purpose publication: to provide essential information, technical and otherwise, and to stimulate and encourage interest and activity among the members of the Society and others who are, or should be, interested in the subject.

The Persistence of Effort—A final factor that may be stressed is the importance of maintaining clean air education and publicity in a regular manner, and year after year. The same rule applies, of course, to many forms of propaganda and advertising, but for clean air it is important because as far as we know the resources are nowhere available for the large-scale and massive publicity that might quickly end the need for further effort. In our own case, and we think it is the case in other countries, it is a matter of putting very limited resources to the best possible advantage. It is suggested that it is better to employ those resources on activities that are steady and persistent, even though limited in scale, than by sporadic major efforts followed by periods of stagnation.

The steady maintenance of interest we have found in our own Society is greatly helped by the regularity of our conferences, by the publication of the journal mentioned above, and by the existence of regional organizations of members, which are able to meet frequently in different towns in their areas—meetings which also provide an opportunity for publicity and the creation of interest in the towns thus visited.

It is hoped that this review of the important and difficult task of education and publicity in the field of ai

pollution, as seen from the viewpoint of one representative of one particular country, may have been of some interest to this Congress and may have done a little towards an understanding of what our national problems have in common and where they may differ. If this is the case then a modest contribution will have been made towards international co-operation and interchange of information in what is becoming recognized as a world problem. There are many problems that concern the world as a whole, including the conservation of our natural environment: earth, sea, and atmosphere. To restore and then maintain the purity of the air we breathe is not among the least important of these tasks.

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- ³Annual Reports of the Chief Alkali Inspectors, Her Majesty's Stationery Office, London.
- ⁴Road Traffic Act, 1930, and Motor Vehicles (Construction and Use) Regulations, 1955, 1957 and 1961.
- ⁵Smoke: A Study of Town Air, by Cohen and Ruston. Arnold, London, 1925.
- ⁶Sulphur Dioxide as an Atmospheric Pollutant. Technical Committee, National Society for Clean Air, London, 1964.
- ⁷Sulphur Dioxide in Flue Gases and in the Atmosphere, by Spengler and Michalczyk. VDI-Verlag, Dusseldorf, 1964.

Review

ELECTRICITY IN THE HOUSE

Planning Electricity in the House, by Philip Honey, M.I.E.E. pp. 176, George Godwin, London, 27s. 6d. net.

Mr. Honey, who was for many years with the Electrical Development Association, and is a member of the N.S.C.A., has made good use of his time since his retirement a short time ago, by writing this knowledgeable, expert, and very practical work on all aspects of the use of electricity in the home. It will be of considerable value to architects and builders, domestic heating electrical engineers, householders, and the do-it-yourself fraternity.

One chapter deals generally with electricity in Great Britain, and another with the benefits of the all-electric house. There is a detailed chapter on the installation itself, and others on space heating, water heating, and miscellaneous electrical equipment. There are many illustrations and diagrams. Altogether a very useful book.

Bonfire Smoke Restriction

At the annual meeting of the Association of Municipal Corporations at Torquay in September, Councillor H. Bagley of Wolverhampton, sought action to allow garden bonfires on only one evening a week. Thousands of pounds were spent on clean air, he said, and yet anyone was allowed "freedom to foul the summer nights with obnoxious garden fires", which damaged property and affected people's health. He knew of people leaving areas because of the number of bonfires burning at night. He was advised to submit a resolution for the health committee to consider.

N.S.C.A. Exhibits

The Society participated in the Exhibitions organized by the Association of Public Health Inspectors at Blackpool in September, in conjunction with their annual conference, and at the conference of the Royal Institute of Public Health and Hygiene at Weymouth in October.

AIR POLLUTION ABSTRACTS

Abstracts of Papers Presented at N.S.C.A. Annual Conference, Eastbourne, 1965

815. Presidential Address Wilson, Sir Alan. The paper emphasizes the need to increase the speed with which economic clean air measures are being adopted. Reviewing the findings of the Warren Spring Laboratory based on air pollution measurements, the author concludes that although the total pollution by smoke has been considerably reduced, the diminution in domestic smoke has been disappointingly slow. Figures show an increasing emission of sulphur dioxide and also that in the London region it has increased by about 80 per cent as compared with slightly less than 25 per cent in the country as a whole. As for concentrations at ground level, it is apparent that London is now much less smoky than other towns, but more polluted with sulphur dioxide. Discussing the effect of smoke control areas, the author states that the size of these so far, is too small to have a major effect. The view is taken that in order to make a big impact on the problem, it is necessary to deal with areas of the order of five square miles as a single unit and containing about 100,000 inhabitants. Nevertheless, surveys show that smoke concentrations are considerably reduced even in small smoke control areas by changing over to smokeless fuels. The pollution by sulphur dioxide has remained constant, but it is shown that much more of it is dispersed into the upper atmosphere than is smoke. In smoke control areas, replacement of coal by coke reduces the sulphur dioxide by about 40 per cent. As a solution to the problem of smog, the paper advocates town planning, accompanied by the control of emissions by the regulation of fuel usage.

816. Successes with Smoke Control: Manchester. Richards, J. There has been some form of smoke control in Manchester for over 120 years, and because powers to control the nuisance were sought early, the city has been called "The Home of Smoke Abatement". Manchester was the first local authority in this country to obtain powers, under the Manchester Corporation Act, 1946, to establish "Smokeless Zones", and 14 such zones were established prior to

the Clean Air Act. The policy of the City Council is to make most of the city smokeless by 1970. The programme is being vigorously implemented; 41.5 per cent of the total area of the city, and 27 per cent of the total premises, are already subject to smoke control orders. Smoke has been reduced by 25 to 44 per cent in existing smoke control areas, despite the proximity of other areas not yet under smoke control. Nevertheless, pollution levels are still dangerously high in some parts of the city during periods of fog. A great deal of work remains to be done, and there is no complacency at the rate of progress.

817. Successes with Smoke Control: Sheffield. Batey, J. W. The paper reviews the history of smoke abatement in Sheffield and describes the programme for smoke control areas. The method of using ward boundaries for smoke control areas is recommended. Tables are given showing the improvement in atmospheric conditions, since 1956, in respect of both smoke and sulphur dioxide.

818. Successes with Smoke Control: Scunthorpe. Allen, G. O. After reference to the industrial problems in Scunthorpe the paper describes the approach to domestic smoke control and the problems encountered and successfully overcome. The value of pollution records is emphasized and the administrative work involved is described. The paper stresses throughout the importance of securing the co-operation of everyone concerned. In conclusion, a number of practical questions is posed, on which comment is invited.

819. Solid Fuel Distribution and Supply Problems: (1) Otty, Eric. Methods of delivering solid fuel have not changed materially over the last century. Largely as a result of the re-organization of British Railways, a number of fully mechanised distribution depots are now in operation. The paper describes some of these depots and emphasizes their importance in the drive for improved efficiency in the field of transport and distribution.

820. Solid Fuel Distribution and Supply Problems: (2) Bourne, W. H. The paper discusses the difficulties arising from the distribution of solid smokeless fuels, from the depot to the consumer, and the changes that have taken place in recent years, especially in relation to consumer requirements. The problems of handling, transport and delivery are considered, together with other matters of importance, including the packaging of solid fuels and the special case of storage and delivery in flats, the Weights and Measures and the Merchandise Marks Acts, and the question of finance.

821. A Recent Survey's Findings Concerning Air Pollution and Mortality from Lung Cancer and Bronchitis. Wicken, A. J. The paper is based upon the report of a recent survey concerning the environmental factors associated with lung cancer and bronchitis mortality in several local authority areas in North East England. The results of the survey are briefly outlined with particular reference to the associations which lung cancer and bronchitis mortality were found to have with the area of residence and air pollution. Differences in lung cancer and bronchitis mortality rates were found between urban and rural areas and localities of different environmental character within a particular local authority area. These differences did not result from variation in the age, smoking habit or social class composition of the various areas and localities. They were, however, accompanied by differences in the level of air pollution, which indicates that both lung cancer and bronchitis mortality are associated with air pollution. The paper concludes with a discussion of the value of carrying out investigations of this kind in particular local authority areas.

822. Odour Control by Catalytic Combustion. Betz, Erwin. This paper outlines generally the problems which have been dealt with satisfactorily by catalytic combustion, the economics of catalytic combustion and alternative methods for the removal of odorous effluents.

823. Prevention and Control of Pollution from Road Vehicles in Belgium. Coucke, E. J. After statistical information on Belgium (Inhabitants—road system—motor vehicles), the Belgian comprehensive scheme of vehicle inspection is described in some detail and also the function of the Belgian Fund for Study and Research on Road Safety. Following

chapters concern: Diesel exhaust smoke from motor vehicles; (Instrument and method of measurement—Practical experiments in 1960 and 1961); Pollution by exhaust gases from petrol engines (American, Belgian and French contributions to the solving of this problem); Precautions against pollution in the vehicle inspection stations; Belgian legislation and regulations on air pollution in general and air pollution by motor vehicles.

824. New Horizons in Domestic Heating: Oil. Brewster, H. R. In developing new techniques for applying oil heating to domestic premises the oil industry has the spur of competition within its ranks as well as the pressures from gas, solid fuel and electricity. Every new development must therefore be commercially viable, and show some advantage over competitive means of heating. Since oil is burned smokelessly it has an important part to play in smoke control areas and in clearing the air in areas yet to be scheduled. In addition, the very low sulphur content of light domestic fuel oil results in a considerable reduction of SO_2 emission from low level chimneys where oil firing replaces open fires in domestic premises. To meet the requirements of the modern well-insulated dwelling, new oil firing equipment is coming on to the market, providing low cost heating. Units are available for the living room giving radiant heating and convection, with or without hot water, and with capacity to give a measure of air heating to the rest of the dwelling. There are also new central units providing air heating for the whole dwelling together with domestic hot water. These may either be built into brick structure during building construction or be supplied as complete prefabricated assemblies. Operation is simple, and capital and running costs low. If new equipment is to be successful then it must be installed and maintained properly. In order to achieve this, suitable training must be provided for the trade. This is already being done, courses being given for Maintenance Engineers, Installers and Installer Executives. As a direct result of this training, standards of installation have risen considerably, and they will continue to rise in the future. For new houses, the provision of a piped and metered oil supply offers great scope for development and can be of particular interest to local authorities concerned with re-development of certain types of older property. In district heating,

as in industry generally, oil will take its part based on the advantages of ease of delivery, compact storage and the degree of automatic operation that can be provided. The distribution networks of the Oil Companies provide reliable rapid fuel delivery everywhere in the country and these facilities are expanded in step with growth of demand and refining and production capacity. Oil will play a very important part in reducing atmospheric pollution whilst providing better standards of heating.

825. New Horizons in Domestic Heating:

Gas. Bruce, R. N. The new and economic methods of gas production based on the steam reforming of light petroleum fractions at high pressures are described. The types of gas produced are almost free from sulphur as are the stack gases discharged by these plants into the atmosphere. They thus make an even greater contribution to clean air than the obsolescent traditional coal carbonizing plants. The various methods of enriching lean gases by refrigerated natural gas, liquid petroleum gases, refinery gases and the new Gas Council processes, all of which are substantially sulphur free, are also described. The part which could be played by other sources of natural gas, such as those which might be discovered in the North Sea, is discussed. The increasing part which Towns gas is playing in the clean air campaign is also considered; this is due to the increasing public demand for this competitive, piped, clean fuel. Annual increases in gas demand are estimated to be eight per cent, due particularly to the development of: (1) new highly efficient convector gas room heaters; (2) whole house heating by ducted warm air systems; (3) small bore gas central heating systems also providing domestic hot water; backed up by promotional price tariffs. Figures illustrating this increase in demand, e.g. a sale of nearly one million fires in the year 1964-5, and further possible increases based on experience in the United States of America when plentiful supplies of natural gas were made available are discussed. Finally, the evidence of the public's increasing choice of gas for house heating when given freedom of choice is substantiated by independent testimony.

826. Solid Fuel—with particular reference to district heating. Reid, W. The paper shows the direction in which the Solid Fuel Industry is meeting the modern requirements of greater comfort at low

cost, more efficient combustion and, therefore, a cleaner atmosphere. In this context the Industry has developed smokeless fuels and is increasing productivity of these to meet the rising demand. It has collaborated with the Appliance Manufacturers to produce new attractive, efficient and as near as possible automatic appliances. Perhaps the most recent important development is in the direction of district heating. The paper describes in some detail the first comprehensive district heating scheme to serve multi-storey residential flats, the town's centre and cultural and educational facilities as well as adjacent light industry.

827. Off-Peak Electricity. Melling, C. T. The paper reviews the different fuels used in the home, and discusses the heat-comfort required by the occupants of room. The three general types of heating using off-peak electricity are floor-warming, Unit Plan heating, and warm air heating, and these are discussed in some detail. The paper concludes by emphasizing that the day-time or afternoon off-peak boost for storage heaters will continue to be available.

828. The Selection of Industrial Dust Collection Plant. Hodgson, J. The nature of grit, dust, and fumes is discussed, and the types and systems available for their removal methods are described, and advantages and disadvantages of different methods noted. The methods are reviewed under the main headings of settling chambers, inertial collectors (cyclones), fabric collectors, wet collectors, and electrostatic precipitators. The paper concludes with information and observations relating to the selection of equipment for different requirements, and it is emphasized that the problems of industrial dust collection are complex and that selection is best left to the specialist.

829. Chimney Heights—Progress and Problems Since the Memorandum. Beaumont, S. C. (Proc. N.S.C.A. Con., Eastbourne, 1965). The paper follows the progress of assessing chimney heights since the Clean Air Act, 1956, came into force. Efforts were made to arrive at some degree of uniformity by local authorities in the determination of adequate chimney heights in order to disperse chimney gases so that maximum ground level concentrations should be an acceptable minimum. Reference is made to some of the problems for which it is considered the Clean Air Act and Memorandum do not provide an answer.

830. Unresolved Problems in Air Pollution: Alkali and Works. Ireland, F. E. The Alkali Act recognizes that complete elimination of all industrial waste gases is impossible, although with concentration of industry into larger units and the erection of tall buildings, it is becoming more than ever necessary to solve the industrial problems of prevention rather than to rely on dispersion. There follows a review of some of the unresolved problems relating to sulphuric acid, nitric acid ceramic, iron and steel, non-ferrous metals, metal recovery and lime works.

831. Unresolved Problems in Air Pollution: The Local Government Sphere. A report of the Parliamentary and Local Government Committee. 1. The allocation of certain processes to control by Alkali Inspectors removes many of the unresolved problems from the local authority field. 2. Domestic smoke control work is still affected by changes in the types of solid smokeless fuel available. 3. Whilst smoke from industrial plants is not now so serious a problem grit and dust and burning of materials in the open air still require more effective control. 4. Pollution by sulphur and road vehicle exhaust continues.

General Air Pollution Abstracts

832. An Interesting Experiment, Made with the Vehicles of the Parisian Prefecture de Police, in order to reduce the rate of Carbon Monoxide emitted by Petrol Engines. Thiebault, R. (CIDITVA Bulletin, 1965, No. 23). Since 1959, the Municipal Laboratories of the Prefecture de Police have been systematically measuring atmospheric pollution in Paris, deducing the general picture from the carbon monoxide (CO) percentage. The many recordings made have led to three main conclusions:

- (a) Practically no CO during night hours, when motor traffic is sparse.
- (b) Definite correlation between density of traffic flow and CO rate.
- (c) Increase of each vehicle's contribution to the CO rate as traffic becomes less fluid, causing vehicles to stop frequently with motor idling.

This together with the fact that idling represents 75 per cent of the time spent on a journey in heavy rush hour traffic, led to the idea of adjusting the relevant arrangements of the carburettor in order to reduce exhaust toxicity to a minimum without hampering the engine. The method for adjusting the idling and slow running arrangements of the carburettor is described and results obtained are shown in a table. This method was successfully applied to all 1,300 police vehicles and brought about the additional advantage of a considerable air pollution abatement in the police garages. Author suggests an education campaign for mechanics and maintenance personnel and wide information of the public on this subject and method.

833. Air Pollution by Sulphur Dioxide: Part 2: Sulphur Dioxide Concentrations Downwind of Tall Chimneys—Divergence of Measured and Calculated Values. Cummings, W. G., Redfearn, M. W., and Roberts Jones, W. (Journ. Inst. Fuel, Oct. 1965, 38, No. 297, 426-436). During a fortnight's intensive survey, sulphur dioxide concentrations were measured downwind of Castle Donington Power Station. The patterns and levels of sulphur dioxide pollution were established for a number of weather conditions and compared with values calculated by means of the Sutton, Bosanquet, Priestley, and Lucas and Spurr formulae for gas diffusion and plume rise. Most measured and calculated values agreed to within a factor of three; this is considered to be reasonable considering the unknown meteorological factors obtaining during the survey period. The reasons for the divergence of measured and calculated values are discussed, and it is concluded that the easiest way of calculating the level and extent of sulphur dioxide pollution from a power station is to use Lucas and Spurr's plume rise equation, followed by a simplified Sutton diffusion equation, provided the equations are modified to take account of turbulence caused both by meteorological conditions, and by the topography of the ground over which the plume passes.

834. Air Pollution by Sulphur Dioxide: Part 3: The Effect of Increased Chimney Height on Ground Level concentrations of Sulphur Dioxide. Cummings, W. G., Redfearn, M. W. and Roberts Jones, W.

(Journ. Inst. Fuel, Oct. 1965, 38, No. 297, 437-442). The effect of increasing the chimney height at East Yealland power station from 127 to 172 ft. was assessed by comparing the patterns and concentrations of sulphur dioxide pollution for high and low chimneys over a limited range of weather conditions. With the shorter chimney, the plume was affected by a turbulent zone near the power station building at wind speeds greater than about 19 ft./sec. whereas with the taller chimney difficulties were caused only with wind speeds greater than about 26 ft./sec. The maximum ground-level concentrations of sulphur dioxide close to the power station was also reduced from about 50 p.p.h.m. to about 25 p.p.h.m. within the limited range of weather conditions obtaining during the survey period. However, at wind speeds at which the plume was unaffected by the turbulent zone near the station building the patterns and concentration of sulphur dioxide pollution were not changed by the increased chimney height.

835. Determination of certain Metallic Elements in an Urban Atmosphere. Courtecuisse, S. (in French), (Pollution Atmospherique, July-September 1965, 7, No. 27, 326-333). The paper gives the first results of measuring certain metallic elements contained in the dust of Paris. These elements may be capable of acting as oxidation catalysers for atmospheric gases or as a base for seeking to determine the origin of the pollution.

Pravda Wants to Know

Pravda has revealed that as far back as 1947 a Russian scientist invented a fundamentally new engine which "combined the advantage of carburettor engine and diesels" which burned up all its fuel thereby cutting out air-pollution and which could be made in various forms to use low-grade petrol, kerosene or diesel fuels. In 18 years since then not a single step has been taken officially to build the engine. In the words of a Pravda correspondent, "this is not in the interest of the country, dear comrades from the interested organisations."



Greenhouse in North Kent

Photo: John Topham, Sidcup

Converting the Public To Clean Air

Rev. P. W. Jenkins B.A., L.L.B.

An interested layman, looking at the highly professional movement for clean air, may find one outstanding failure in the campaign which is being waged. *The concept of clean air has not been accepted by the public as a whole with real enthusiasm.*

Readers who live all day in the sterilized atmosphere of a sales department may be surprised at the sweeping nature of such a remark; but for one whose professional life is among large numbers of half-converts and polite disbelievers, the symptoms are easy enough to spot.

Just as the mother of a family notices the lack of enthusiasm in her small son for soap and water, so the public seems to have taken to the smokeless fuels and fires, accepting compulsion recalcitrantly, showing nostalgia for outmoded types of heating, and turning the "new fire" into a status symbol with doubtful success.

Advertisement and Public Acceptance

There is a popular misconception, still lurking abroad in industry, that providing you advertise well enough you will change not only people's habits but their convictions as well. Facts can be always found to support this view—the Gas Council's success in recent campaigning is a typical example, you might say. I am left with the impression, however, that all the smart young husbands with an apron at the cooker have done is to remind other smart young husbands similarly afflicted of a few economic home truths. And that is, surely, the key to it all? The pound does still rule supreme despite the ad-men, and the real response of the public in the long run to any sales campaign will continue to be: How much is this going to cost in the long run?

Arousing an awareness of need is not the only work of the advertiser, but he has the sterner task of persuading the customer to overcome a resistance which will continue despite that awareness, for is it not a fact that there are millions who are quite capable of ignoring needs they have even discovered for themselves? When the salesman is the official in the Public Health Department, then the task is hard indeed. He may be able to point out the public need well enough but he lacks the glamour of a really good sales office to back him up.

How much pressure can the advert put on people, therefore? Can the local authority find the fuel which suits all, or the fire manufacture delve into the statistics of pollution and disease? Social and business ethics, politics and the threat of corruption make these things impossible, and so in the end the campaign selling "smokeless" is hardly any more powerful than the purse it seeks to touch.

The Conversion experience

What clearly is desirable is that longed-for change of heart in John Bull. Instead of fooling around with local schemes to clean ugly public buildings of a former generation in ugly cities, he could go home to Mrs. Bull and say "Ma! it's time we went smokeless". That sort of conscious among the public would really mend matters, and would speed the "smoking out" of industrial offenders.

I may be thought naïve in making such remarks. The parson often seems so, yet within his experience is often more first-hand evidence of the nature of *personal* changes of conviction than are to be found in industry or local government. It is on the personal human level that the movement has failed most seriously.

The programme the Industry should follow is that which aims first to effect a real change in the thinking of every individual. It is a process which can be quite rapid and effective, providing those who are spreading the good news themselves are thoroughly converted, and are not doing it simply for the profit motive.

Technique and Reinforcement

No politician sets about winning his audience or parson his congregation without a few technical preparations. It would seem to an outsider that four main lines should be followed:

1. A strict removal of any trace of vested interest from the campaign. This is what spoils the promotion of many such enterprises. If the National Society for Clean Air could itself sponsor a full-scale national effort this would be best. And the campaign must stand on its own feet, despite the concomitant commercial follow-up.

2. So that the campaign be felt in full, slogans and devices, together with Clean Air Approval certificates should be adopted as standard practices by the Industry, both to support the campaign and to reinforce learning.

3. The campaign should be intense, well-timed, national and intensely personal. Conversion is a result almost entirely of intense activity, never of slowly reasoned logic. The personal approach may be in terms of home economies, housepainting, smaller washing bills, children's health, facts of health dangers and, of course the social "Everyone's going smokeless, Dear."

4. Finally there is something which cannot be given by the Industry or by interested local authority servants. It is wholly necessary for the successful conversion of the public's opinion.

The campaign needs to have moments when it is lifted well above the level of money-wise issues and sociological progress ideals. Those without stake in the campaign at all, with conspicuous absence of interest in profit balances or council coverages,

who feel the matter of atmospheric pollution personally and intensely to be real moral issue must be brought in. Whether they are doctors, politicians, housewives or schoolchildren, they and they alone can raise the issue above the grime into moral consciousness of their listeners. And equipped with an awakened humanity who knows what John Bull may do.

AIR POLLUTION IN LONDON

The 1964 report of the Scientific Adviser, Dr. S. G. Burgess, covers the last full year of work under the London County Council. From 1 April, 1965, the scientific branch has been transferred to the Greater London Council, by whom this report is published. It is now the principal function of the branch to provide scientific advice and assistance to the Council, its committees and departments and to undertake research.

As regards air pollution, which had been regularly measured at 23 sites in the County, the yearly average concentrations of sulphur dioxide in London during 1964 remained at about 220 microgrammes per cubic metre, as in previous years. "As far as can be seen under present circumstances", states Dr. Burgess, "a reduction in the pollution of the air by sulphur dioxide is to be expected only from a widespread change-over to gas, which is relatively free from sulphur, or to electricity generated at power stations located well away from built-up areas."

Although on a number of occasions and notably in January, the concentration of sulphur dioxide reached undesirable high levels, the pollution by smoke was always low in proportion. For the first time since the Clean Air Act of 1956, there was a check in the progressive yearly reduction which has been recorded since that date in the average concentration of smoke in the air. A slight increase was in fact recorded, but the level remained low in comparison with former times.

CONTRIBUTIONS TO CLEANER AIR

Industrial and Commercial News

NEW ALL-OPEN FIRE

Lord Robens, attending a press conference to launch the new "Fantom" forced draught fire, manufactured by R. Baxendale & Sons Ltd., said that the National Coal Board wished to be closely associated with this enterprise. The reason was that this new appliance had the advantage of being able to burn the whole range of all solid fuels, thus increasing the consumer's choice as well as sales of fuel. As far as smoke control was concerned, Fantom could solve many problems, as it was reasonable in price, easy to fix and burned whatever fuel happened to be available. Local authorities could therefore afford to declare more smoke control areas at a quicker rate than before, and the target of $6\frac{1}{4}$ million smokeless homes in 1975 could well be exceeded in his opinion.

The Fantom is a forced draught inset open fire designed to burn all solid fuels. The forced draught is supplied by a built-in continuous running centrifugal fan with double bladed multivane impellers, driven electrically and controlled by a conventional damper. The fire can be installed in a standard fireplace by a handyman in under an hour—its cost and installation being considerably less than any alternative appliance. The Fantom will burn all solid fuels, including the cheapest, but because of the forced draught, is particularly suitable for solid smokeless fuels, including hard coke such as Sunbrite and gas cokes. It is claimed that hard cokes, which will not burn on ordinary fires, burn well on the Fantom. The increased draught ensures easier and quicker lighting and tests show that an output of 5,000 Btus an hour can be obtained in under half the time taken by ordinary fires. There



The Fantom Fire

is also no long wait for the fire to burn up after refuelling with smokeless fuels.

Temperature Control in the Home

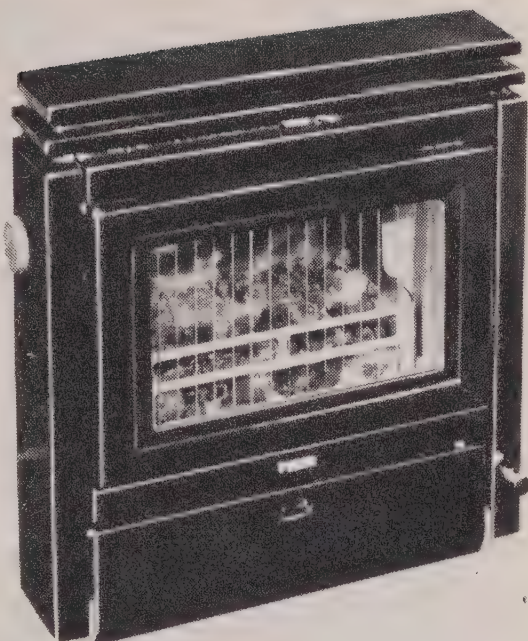
Satchwell Control Systems Ltd., a member of the Elliott-Automation Group, recently performed what can best be described as a public service in publishing a "Heating Engineers Guide" to the installation of automatic controls for domestic central heating. This handbook describes the different schemes that may be called for to meet different requirements, taking into account differences

in comfort requirements, extent of the central heating installation, and so on—nine schemes in all. The purpose of the exercise—and also the purpose of the lecture courses the company runs up and down the country—is of course to promote the use of their own products, but in addition they are doing something that needs urgently to be done. We quote, with full agreement, what they themselves say:

Domestic central heating is fraught with problems which stem from the extremely rapid advances there have been in the techniques of automatic control. Indeed, it is estimated that there are some 15,000 firms in Britain which between them install space heating systems in about 300,000 homes annually. Many of these firms have no really deep understanding of the nature of the technical problems involved nor of the extent to which it is now possible to control the temperature of the living quarters in a house. It is possible for some of them to tell their clients that a temperature controlling thermostat on the boiler will provide adequate control of room temperature. This, of course as most reasonably well informed people know quite well, is, quite simply, not true. Boiler controls control the temperature of the water in the boiler and nothing else. It is as simple as that.

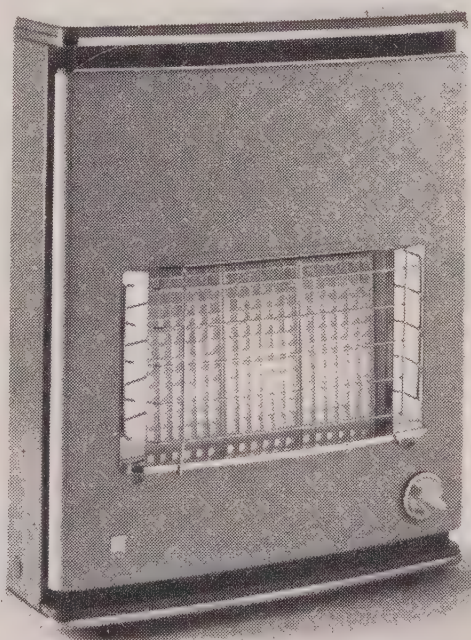
What matters in a home is not the temperature of the water in the boiler nor yet the temperature of the radiators but the temperature of the air in the rooms and hallways of the house. Given that the boiler heats the water to a pre-determined temperature, then an efficient automatic control system can control the ambient temperatures in the house to provide constantly a comfortable environment and may, at the same time, cut down substantially on the amount of fuel consumed.

Readers interested in the Guide and other information about the company's control equipment and systems should inquire from Satchwell Controls Ltd., Farnham Road, Slough, Bucks.



Above is the new Parkray 77 solid fuel room heater of the "open fire behind glass" type. It projects only 4½ in. from the surround and may be fitted with a ten position thermostatic control, or with manual control

Below is the new Radabeam 800 gas fire, selling at the economical price of £19 17s. 6d. including P.T. (outside Scotland). Both appliances are Radiation productions





New Storage Heater—The photo at left shows the Revo Model 30F (3 kW) "Electrique" controlled output storage heater, made into a decorative feature by siting it below a set of bookshelves. It is one of a set of new matching unit-plan heaters introduced by Revo Ltd. (Tipton, Staffs). Price, £49 19s. 6d., from Electricity Board showrooms.

Solid Fuel Heating

The National Coal Board have included in their housewarming campaign and exhibitions a number of attractively produced brochures. One, *Heating Britain's New Homes* is a well-illustrated technical study produced for estate developers, and another is *All About Better Heating with Solid Fuel*—this is a glossy with some admirable colour photographs of houses, people and also solid fuel appliances. It contains much practical, and persuasive, information.

CLEAN AIR BY WAY OF CATALYTIC COMBUSTION—

DECATOX

the new economic Catalytic AFTER-BURNING PLANT

for the destruction of all kinds of organic toxic and obnoxious industrial waste gases

- Uses base-metal oxide catalysts. No necessity for precious metal catalysts
- Burns at approximately only 250°C
- Low initial and running costs
- If the concentration of gases to be burned is high enough, then through the exothermic process additional heat is obtained that may be utilised industrially to show considerable economic gain to the user.

Enquiries invited by sole agents in the United Kingdom.



ARPAL (ENGINEERS) LTD., Abford House, 15 Wilton Road, London, S.W.1. Tel: TATe Gallery 0821

CLEAN AIR

The case for SOLID FUEL

Comfort

Most people still prefer the cheerful comfort of a solid fuel fire. A modern room heater or underfloor draught fire burning Sunbrite gives them just that, and meets all requirements of the Clean Air Act.

Health

With these appliances, unnecessary draughts are eliminated, but a natural circulation of air is encouraged, avoiding the discomfort and condensation problems associated with lack of ventilation.

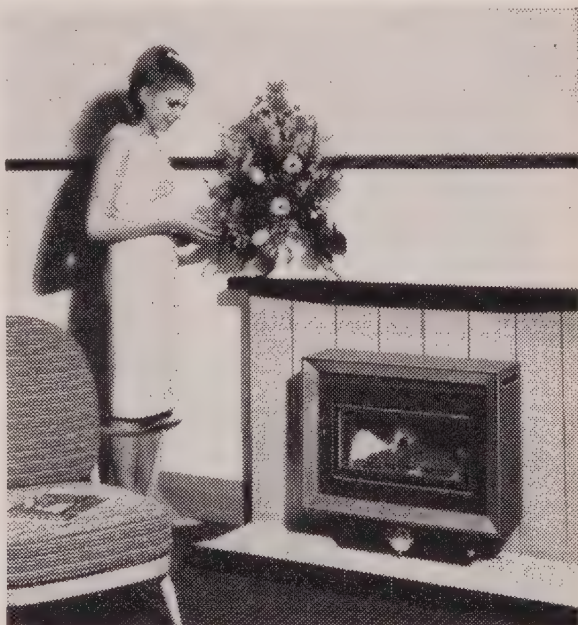
Efficiency

Room heaters are twice as efficient as the ordinary open fire, and boiler models are available to provide hot water and serve radiators.

Lower costs

Official Ministry figures prove that running costs for room heating plus hot water supply can be 25% lower than with any other fuel system.

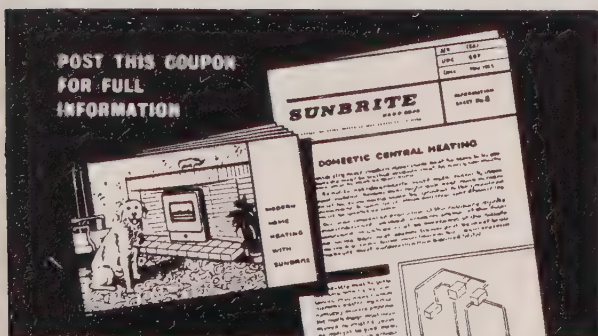
Room heaters and underfloor draught fires qualify for replacement grant in Smoke Control Areas. Solid smokeless fuels such as Sunbrite give excellent results on them.



Chatelaine Inset Room Heater



Baxi Underfloor Draught Fire



TO: THE BRITISH COKING INDUSTRY ASSOCIATION
74 Grosvenor Street, London, W.1.

Please send literature on room heaters
and underfloor draught fires using Sunbrite.

NAME _____

ADDRESS _____

SA

MODERN HEATERS

for the MODERN HOME or OFFICE



buy **sager**

*Illustrations showing the MH4
in an office and in the home.*

The Knightsbridge range of heaters have been designed for incorporation within a normal building structure. Alternatively, installations for internal walls of breeze block structure require a surface mounted surround.

PRICES RANGE FROM
14gns. to 22gns.

All prices include Purchase Tax.

Full details from:



S·A·G·E·R MANUFACTURING LTD.
ORCHARD HOUSE, POTTERS BAR, HERTFORDSHIRE
or Telephone : Potters Bar 57121 Ext. 241

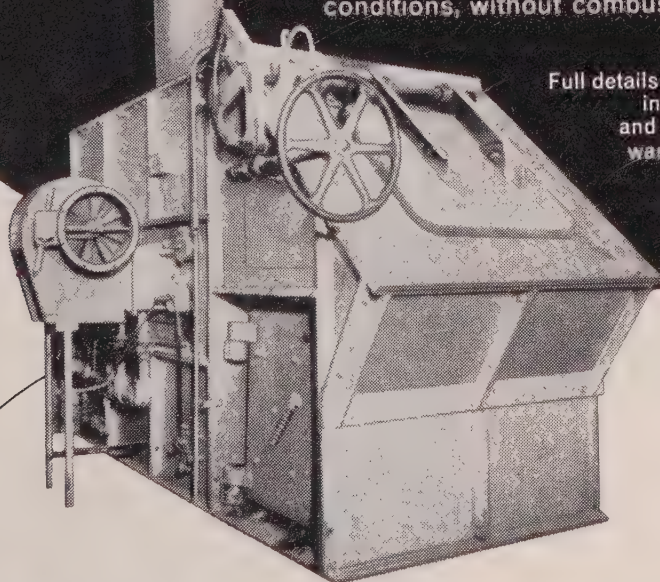
The RILEY GASERATOR

ECONOMICAL, HIGH-SPEED SOLUTION
TO ALL WASTE DISPOSAL PROBLEMS

High-speed destruction of industrial and canteen refuse, rubberised, plastic coated materials and medical disposables etc.

All are handled under completely smokeless conditions, without combustible residue.

Full details of the complete range of incinerators for specialised and the more usual industrial wastes available on request.



Riley

Brochure **G 649**
for full technical information on this equipment

RILEY (IC) PRODUCTS LIMITED

One of the International Combustion Group of Companies.

NINETEEN WOBURN PLACE, LONDON, W.C.1. Telephone: TERminus 2622

IN.40



URGENT
NO SMOKE SIGNAL
FROM BIG CHIEF CLEAN AIR

Going
smokeless?

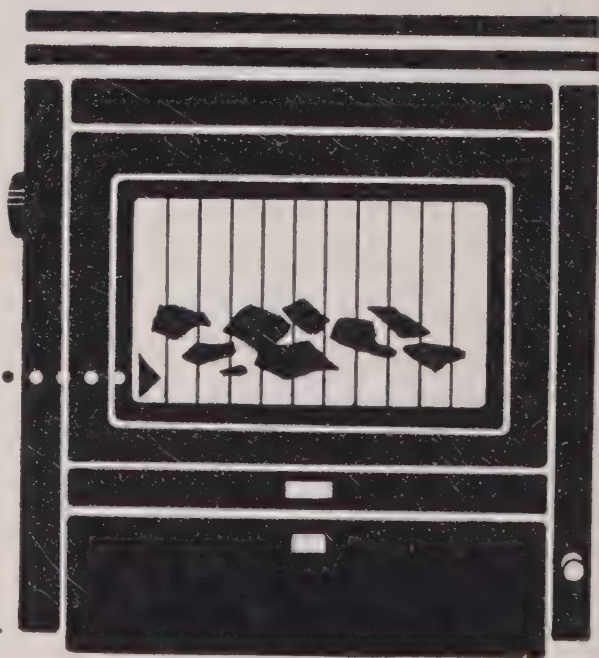
Fit Britain's top-selling room heater

Parkray

open fire
behind glass.....



A RADIATION PRODUCT



The officially approved smokeless fire
that keeps the whole house warm

RADIATION PARKRAY LTD · RADIATION HOUSE · NORTH CIRCULAR ROAD · LONDON · NW10



BEAUMONTS

THE CHIMNEY SPECIALISTS

First in the field with
New Designs and Techniques

★ **BEAUVENT**
STEEL CHIMNEYS

★ **BEAUVAL**
ALUMINIUM CLADDING

Designed and manufactured
specially to individual plant
requirements

CHIMNEYS ERECTED THROUGHOUT
THE WORLD - EACH CHIMNEY
CARRIES OUR GUARANTEE

Photo by Courtesy of The Oxford
Regional Hospital Board, Townlands
Hospital, Henley

F. E. BEAUMONT LTD.

462-480 RATHGAR ROAD, S.W.9 . ENGLAND

BRIXTON 4066 TELEX 25837



NEW FIRE SAVES COUNCIL £75,000

It's a smokeless Fantom for the coming home!

A new fire is burning to save Councils money—it costs less to buy, less to install, and burns *ALL* smokeless fuels brilliantly... *Sunbrite, hard cokes, bituminous fuels etc... all to a fine white ash.*

The saving on a conversion of 5,000 houses in a smokeless zone? £75,000, when compared with any other Approved Appliance guaranteed to burn *all* types of smokeless fuel.

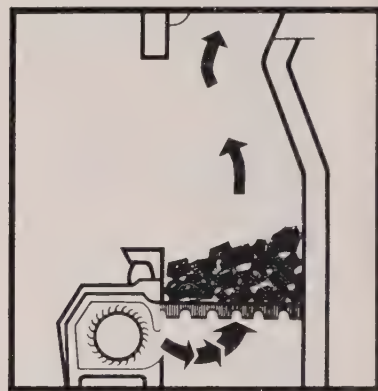
Meets Clean Air Act

The Fantom fire is suitable for installation anywhere, but has been specially designed to conform with the requirements of the Clean Air Act.

Built-in Fan Works Wonders

Secret of the Fantom's success as a forced draught open fire is its built-in centrifugal fan and damper control. So the Fantom...

- * **BLAZES FAST** . . . in less than half the normal time.
- * **BANKS OBEDIENTLY** . . . for overnight economy and . . .



* **GETS BACK TO A BLAZE** in half the normal time.

Cheaper to Buy and Install

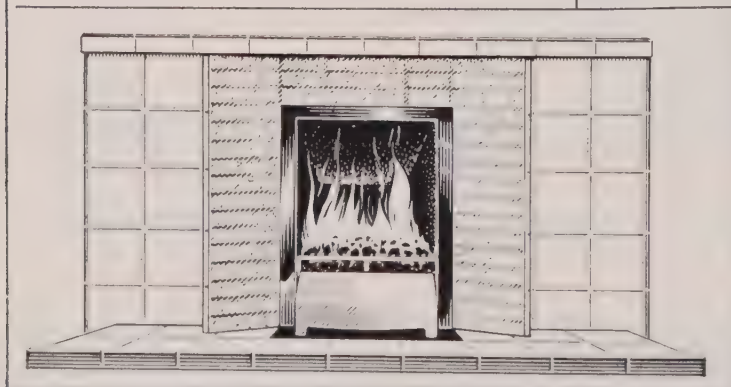
At the incredibly low price of £14.9.8d. for the boiler model and £15.9.8d. for the non-boiler model, the Fantom leaves any other fire standing.

Fixing? All it needs are two screws fixed in *one-eighth* of the time it takes to install any other smokeless fire! No structural alterations needed. Average cost—£1!

Hot Water and Central Heating too

The Fantom can be fitted to any existing back boiler in any standard 16" fireplace—or installed with a new one to supply all domestic needs.

With a radiator back boiler, the Fantom can supply up to 6 radiators.



FANTOM

SMOKELESS FIRE

Enquiries please to:

R. BAXENDALE & SONS LTD.,
BAMBER BRIDGE, PRESTON, LANCs.

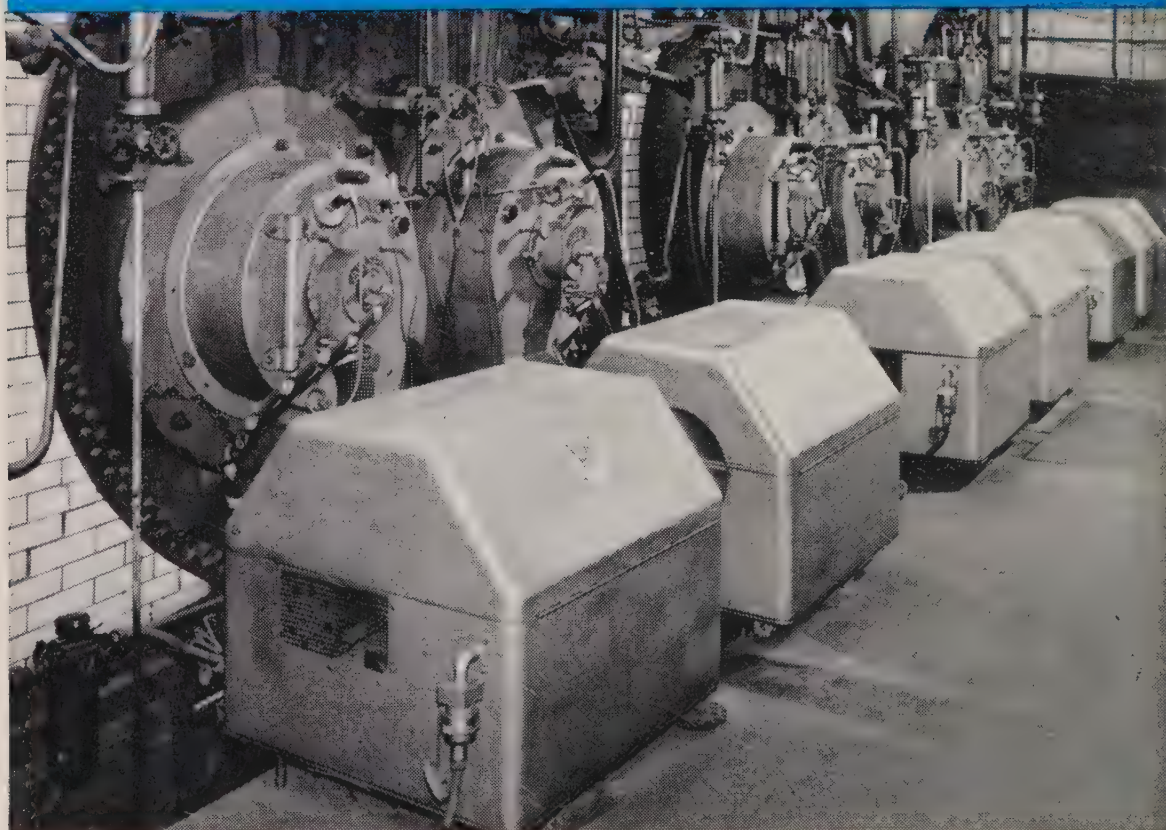


Smokeless Rex says:

**Rexco's easier to light,
Rexco burns so clean and bright,
Rexco heat is good and strong,
Rexco fires last so long,**

**ask your merchant—don't delay
for **REXCO** today.
SMOKELESS COAL**

Conversion to Oil-Firing is **SIMPLE** with Edwin Danks turbine driven Rotary Cup **'AIRSPIN' OIL BURNER**



*Photograph by courtesy of MORRIS COMMERCIAL CARS LIMITED
another successful conversion by Edwin Danks of Oldbury.*

Converting your boiler plant to oil-firing need not entail a major disorganisation or serious loss of production. The installation of Edwin Danks 'Airspin' Oil Burners is normally straightforward and simple.

Information on conversions — MULTIPLE and SINGLE UNIT—will be sent on request; and consultations freely arranged to discuss the advantages of the 'Airspin' Burner in your own plant.

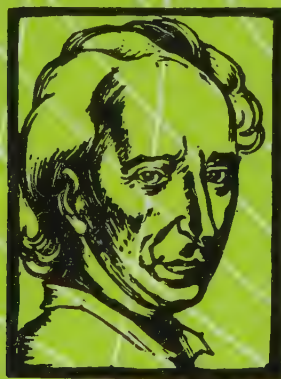


EDWIN DANKS & CO. (OLDBURY) LTD.
OLDBURY near BIRMINGHAM TEL: BRIERLEY HILL 77331

DESIGNERS AND MANUFACTURERS OF COMPLETE BOILER-HOUSE INSTALLATIONS & ANCILLARY EQUIPMENT

SMOKELESS AIR

JOURNAL OF THE
NATIONAL SOCIETY FOR CLEAN AIR



No. 137 ★ SPRING 1966 ★ 3s.


In this Issue

The Reluctant Authorities ★ Incapacity for Work Report
London Congress Takes Shape ★ Vehicle Exhausts and Health
New U.S.A. and S. Africa Clean Air Acts



**Whatever
the process...
have a clear
conscience on
FUME CLEANING**

Steelmaking processes raise their own fume cleaning problems. Head Wrightson experience ensures highest efficiency cleaning with trouble-free operation. Their list of recent contracts is proof of leadership in the design and erection of dust and fume plant for every process, including the new oxygen processes.

Head Wrightson 

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Teesdale Ironworks · Thornaby-on-Tees · Yorks · Tel: Stockton 62241

TW1333

NATIONAL SOCIETY FOR CLEAN AIR

Open Meeting

on the

CLEAN AIR ACT 1956 - 1966

at the

*Connaught Rooms
Great Queen Street
London, W.C.2*

Monday

9 May, 1966

at 2.45 p.m.

The meeting, which will follow the Annual Luncheon of the Society (see separate notice) will both commemorate the first decade of the Act and look to the future by discussing any changes or additions required in the light of experience and changing conditions. After short opening address it is hoped there will be a full discussion.

Chairman: James Goodfellow, F.R.S.H., M.A.P.H.I.
Principle Speakers: Sir Hugh Beaver, K.B.E.
Sir Gerald Nabarro, M.Inst.F.
J. L. Burn, M.D., D.Hy. D.P.H.
The Chairman of the NSCA Parliamentary
and Local Government Committee,
E. M. Birtwisle, M.R.S.H., F.A.P.H.I.

(Sir Hugh Beaver was Chairman of the Committee on Air Pollution that recommended the Act; Sir Gerald Nabarro took a leading part in securing the early passage of the Act by Parliament after introducing, with the support of the Society, a Private Member's Bill; Dr. Burn, a former chairman of the NSCA, was a member of the Beaver Committee; Mr. Birtwisle will present on behalf of the Parliamentary and Local Government Committee a report on the views of the Society's Divisions on possible changes to the Act.

It will facilitate the arrangements if this Reply Form could be completed and returned by those attending

To the Director
National Society for Clean Air
Field House, Breams Buildings, London, E.C.4.

I hope to be present at the meeting to be held on 9 May, 1966.

Signed.....	.....
Address .....	.....
.....
.....

NATIONAL SOCIETY FOR CLEAN AIR

Field House, Breams Buildings, London, E.C.4

CHAncery 5038

ANNUAL LUNCHEON

Following the Annual General Meeting of the Society on Monday, 9th May, 1966, there will be a luncheon, also at the Connaught Rooms, Great Queen Street, London, W.C.2., at 12.30 for 1.00 p.m.

The Principal Guest and speaker will be

The Rt. Hon. R. H. S. Crossman, O.B.E., M.P.

Minister of Housing and Local Government

Tickets for the Luncheon, for Members and their Guests, will be reserved on receipt of the completed application form below. The price per ticket is 28s., inclusive of gratuities but not drinks.

Yours faithfully,

Arnold Marsh

Director

*The Director
National Society for Clean Air
Field House, Breams Buildings
London, E.C.4*

Please reserve and forward in due course ticket(s) for the
Luncheon on 9th May, 1966, for which I enclose 28s. per ticket.*

Signed.....

Name and Address for tickets
(BLOCK letters, please)

.....

.....

.....

**Cheques to be made payable to the National Society for Clean Air*

Gas heat for clean air homes

Domestic heating is the most important consideration when a district becomes a Smoke Control Area. Consider the advantages of gas.

Most homes use gas for cooking. A clean, smokeless fuel is on tap. The installation of radiant-convactor gas fires providing automatic, efficient, labour-free heating is a simple matter. They are as cheap to run as traditional fires and because tariffs improve as more gas is used, the householder gains additional economies. Gas appliance sales are booming, particularly for those heating the home. The public wants this clean, convenient, economical fuel. It is the ideal answer to smoke control problems.

Gas Boards offer a comprehensive service and have helped many local authorities with advice on clean air conversions. The Commercial Manager of your Gas Board would be pleased to help you.

HIGH SPEED GAS



Gas is used extensively in these houses at Dulwich Wood Park, London, built by Wates Built Homes Limited.

MODERN HEATERS

for the MODERN HOME or OFFICE



buy **sager**

Illustrations showing the MH4 in an office and in the home.

The Knightsbridge range of heaters have been designed for incorporation within a normal building structure. Alternatively, installations for internal walls of breeze block structure require a surface mounted surround.

PRICES RANGE FROM
14gns. to 22gns.

All prices include Purchase Tax.

Full details from:



S·A·G·E·R MANUFACTURING LTD.
ORCHARD HOUSE, POTTERS BAR, HERTFORDSHIRE
or Telephone: Potters Bar 57121 Ext. 241

CLEAN AIR

The case for SOLID FUEL

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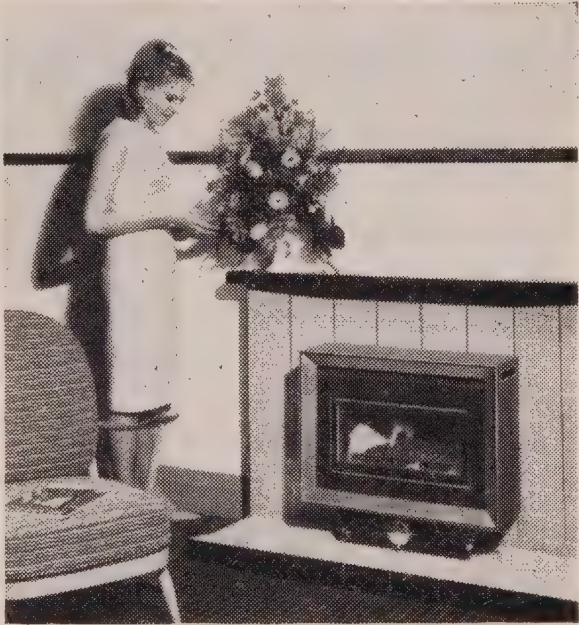
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Official Ministry figures prove that running costs for room heating plus hot water supply can be 25% lower than with any other fuel system.

Room heaters and underfloor draught fires qualify for replacement grant in Smoke Control Areas. Solid smokeless fuels such as Sunbrite give excellent results on them.



Chatelaine Inset Room Heater



Baxi Underfloor Draught Fire

POST THIS COUPON FOR FULL INFORMATION

SUNBRITE

DOMESTIC CENTRAL HEATING

NAME _____

ADDRESS _____

SA

TO: THE BRITISH COKING INDUSTRY ASSOCIATION
74 Grosvenor Street, London, W.1.

Please send literature on room heaters and underfloor draught fires using Sunbrite.

NAME _____

ADDRESS _____

SA

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The Smokeless Fantom cuts conversion costs

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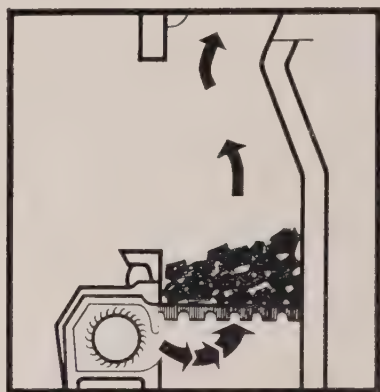
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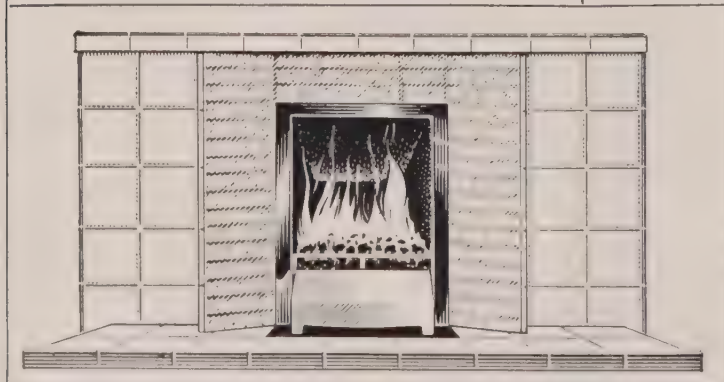
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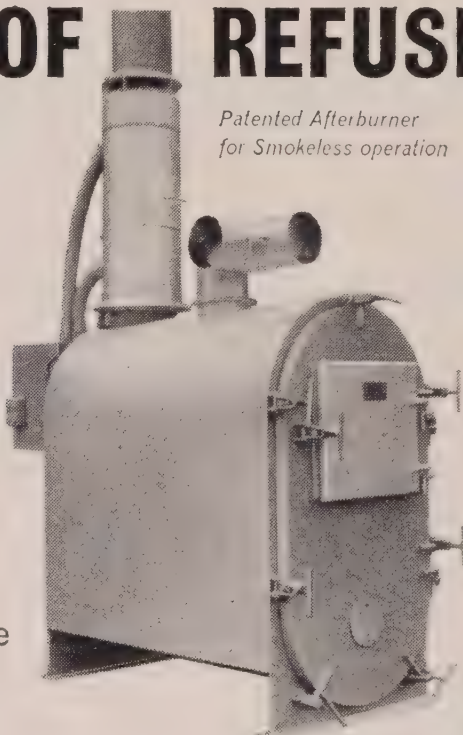
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SMOKELESS AIR

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Spring 1966

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

A Turn of the Screw

ON another page we record in full the text of the letter from the Minister of Housing and Local Government to the local authorities who have failed to act in the making of smoke control areas. The firmness of the wording, and the reference to the possibility of making action a statutory duty, makes this the most serious communication about clean air to be issued since the Act was passed in 1956.

Progress with smoke control has been much slower than had been expected, but progress there has been—and it should not go without note that Greater London has now passed the half-way mark towards the completion of its programme. But the authorities which have not yet done a thing, and the others, which have made only meagre gestures, are, as the Minister says, failing in their duty to their own people.

Legislation to make smoke control a statutory duty might well provide the opportunity for other improvements in the Clean Air Act, especially on smoke control itself. It would be particularly valuable if it were coupled with more satisfactory control over the use of bituminous coal in other than exempted appliances in smoke control areas. At present no legal restraint is possible, all along the line,

until smoke is seen to issue from the chimney. The Coal Merchants' Federation is co-operating in an effort to prevent the sale of non-authorized fuel to users in smoke control areas, but they can only hope to influence their own members, and it is doubtful whether any means exist for withholding supplies of coal to other merchants. Moreover, it is alleged that in some smoke control areas evasions are common and go unheeded. Thus, in a letter to the *Guardian* recently, a Public Health Inspector referred to "press and other reports that I have read from time to time, that some authorities are reluctant to enforce existing orders and that non-compliance in those areas is flagrant and widespread."

If this is happening to any material extent, with authorities that have gone to the trouble and the expense of establishing smoke control areas voluntarily, is it not likely to happen also—and more so—with local authorities who might be obliged, more or less unwillingly, to fall into line?

It seems to be essential that if smoke control should become a statutory duty, very careful consideration should be given to the introduction of new and better methods of ensuring compliance with the intentions of smoke control orders.

The clean air movement will look forward with interest to learn what the response of the reluctant authorities is at the time of the deadline of 31 March. This development gives added point and importance to the meeting the Society is to hold on 9 May, in London. As announced elsewhere, this will be both to celebrate the tenth anniversary of the passing of the Clean Air Act, and to start a discussion on what revisions, or additions, to the Act are now necessary in the light of a decade of experience.

Congratulations

Included in the New Year's Honours List, we were pleased to note, was our Honorary Treasurer, Mr. Stanley E. Cohen, who was made a C.B.E. This follows his arduous and successful year as Chief Commoner of the City of London. Also awarded the C.B.E. was Professor Andrew Semple, Medical Officer of Health for Liverpool. Another good friend of the Society and for a number of years a member of its Executive Council, is Mr. Harold Cass, lately retired as Chief Public Health Inspector for Oldham, whose services to his profession were recognized by the M.B.E. Congratulations and good wishes to all.

The Sickness Report

The recent official report on *Incapacity for Work*, which is reviewed on another page, has received a surprisingly small amount of publicity. Still less attention has been given to the important evidence it gives on the relationship between certain incapacitating diseases and air pollution. This is in fact one of the most significant statements on air pollution and health in recent years. The correlation between pollution on the one hand, and the incidence of bronchitis and other respiratory diseases on the other, is now generally accepted, and

the new report notably strengthens the case.

Statistical evidence such as this does not, of course, prove that air pollution "causes" bronchitis, but it does strengthen the probability that pollution is a factor of importance in the promotion of the disease. The report also indicates that there is a relationship between air pollution and arthritis and rheumatism, and to some extent, influenza.

The report as a whole deserves more public attention than it appears to be receiving. Close on 300 million days of work are lost to the nation's output of real wealth—the £200 millions of sickness benefit might be regarded as simply a transfer of money from one pocket to another—and it is the loss of output, in production and services, that matters most.

Over a quarter of this loss is due to the diseases with which air pollution is associated. Examination of the charts given in the report suggest that if air pollution was eliminated there might be an improvement in the order of 20 per cent. Even if it were only half of this, namely ten per cent, there would still be a saving of 8 or 9 million days now lost because of air pollution. And this is confined to the actual sickness claims of less than half the population, and can therefore be only a part of the price we are paying for air pollution in respect of health.

Haverton Hill

We have been impressed by a slim paper-back described as No. 15 in a series of "Occasional Papers on Social Administration", published under the aegis of a committee of which Professor R. M. Titmus is the chairman. This volume* by Peter Gregory, Assistant Lecturer in Social Administration, University of Hull, is called *Polluted Homes*, and is the story of the Haver-

* *Polluted Homes*, by Peter Gregory. pp. 65. G. Bell & Sons, London, 10s. 6d. net.

ton Hill housing estates in Billingham.

Haverton Hill is described as "probably the most heavily polluted settlement in the country". It lies close to the vast I.C.I. works that is the predominant industry of the area. The report traces the history of the estates since the first part was begun after the 1914—18 war as a "model village", and since the original I.C.I. works began its rapid expansion in 1926, when more houses had to be built by the local authority for the influx of workers. But, by 1937, 116 of the 164 houses stood empty.

I.C.I. have done a great deal to mitigate the problem, but the fact remains that the works is an enormous agglomeration of different processes, building up a pollution complex that admits of no easy solution. Pollution records show a considerable improvement during the period 1947 to 1961, for which figures are given, with a fall in deposits at one site at Haverton Hill from 260 to 99 tons per square mile per month. But in other parts of Billingham monthly deposits range from 11 to 19 tons.

Mr. Gregory reports mainly on a sociological survey made by the Department of Social Studies, University of Durham, on the views of the residents on the situation. One of the main findings was that 56 per cent were anxious to live elsewhere, and that many of the others were influenced more by local ties than by acceptance of conditions. The possibilities of rehousing all the tenants elsewhere, and abandoning the estate altogether, have been under consideration, and the difficulties involved are discussed in the report. The transfer of the population, the demolition or gradual dereliction of the present houses, and other problems make this remedy more difficult than might appear at first sight. The study is interesting and important both in itself, and because it is, as far as we know, the first time such a situation has arisen in this country. We naturally expect to mitigate the effects of air pollution on a neighbourhood by preventing the pollution, not by moving the inhabit-

ants. This seems to be an exception to the rule.

Pigeons

It must be confessed that when the Americans began to bring in pigeons as a significant source of air pollution we did not take it at all seriously. Nevertheless, it seemed that it might be useful to discuss the question and to ask Dr. Burn to write the article that appears on another page. We think it will be agreed that although it may be a local and minor air pollution problem it is one that should be firmly dealt with.

The article seemed to call for an illustration or two, and so, putting on our staff photographer hat, we went looking for pigeon pictures in Trafalgar Square and St. James's Park, still feeling rather sceptical about it all. But after a couple of hours among the pigeons, nauseated by the stench in Trafalgar Square, and revolted by the excrement over everything at the refreshment kiosk in the park, our tolerance gave way to disgust. Not disgust at the individual pigeon, which in ones and twos is a harmless enough creature, but disgust at the messy ubiquity of their droppings, the sour smell in Trafalgar Square, and the knowledge that one was breathing air loaded with minute faecal particles.

It is in fact an amenity, or even an aesthetic, problem as well as one of health. What might be done to mitigate it is not an easy question to answer, as many worried authorities have found. Pigeons as a traditional part of the scene in many cities throughout the world, are an attraction for tourists (and have their commercial uses—you can have a movie made of yourself covered with them, in Trafalgar Square), and in reasonable numbers may give life and movement to the stillness of architecture. What is wanted, it seems, is a really rigorous culling and control, reducing numbers from thousands to tens in the heavily infested areas, and clearing them away altogether from places where people eat and drink.

MINISTER TO BE SOCIETY'S GUEST

The Rt. Hon. R. H. S. Crossman, M.P., Minister of Housing and Local Government has accepted the Society's invitation to be the principal guest, and to speak, at the annual luncheon at the Connaught Rooms, London, on Monday, 9 May next. The luncheon will follow the Annual General Meeting of the Society, and will precede the open meeting on the Clean Air Act announced below. Tickets for the luncheon, at 28s. each, may be obtained on application from the Society's offices. The guests of members will be welcome to attend.

MEETING ON THE CLEAN AIR ACT

Tenth Anniversary

Following the annual luncheon announced above, there will be an open meeting to mark the tenth anniversary of the Clean Air Act. This meeting will also be held at the Connaught Rooms and non-members are invited to attend. Beginning at 14.45, with Mr. James Goodfellow, Chairman of the Council, in the chair, the speakers will be:

Sir Hugh Beaver

Sir Gerald Nabarro

Dr. J. L. Burn

The Chairman of the NSCA Parliamentary and Local Government

Committee (Mr. L. E. Birtwisle).

The addresses will be followed by a general discussion. The purpose of the meeting is first to celebrate the achievements of the Act, and then to consider what changes or additions to it are desirable in the light of experience and changed conditions. Mr. Birtwisle will be reporting, for his Committee, on the views received from members of the Society through their respective Divisions. The opinions of other members and readers, if sent to the Director before 4 April, will also be considered by the Committee.

AIR POLLUTION NEWS

The Society's occasional news bulletin "Air Pollution News", which was a duplicated news or intelligence sheet, had a short but useful life some years ago. It was intended to bring important and topical news and information to members of the Society immediately, instead of after the possibly lengthy delay that is inevitable with a quarterly journal. Publication was halted mainly because of staff difficulties.

It is now proposed to start publication again, with frequency of issue depending on circumstances, but per-

haps averaging a dozen or more issues a year.

For the present copies will be sent free of charge to members, representatives and others closely associated with the Society. (It may be necessary to revise this in time—postage is the principal expense).

If you wish your name to be put on the APN mailing list all that is necessary is that you should write or telephone to the Society asking for this to be done.

EASTBOURNE CONFERENCE PROCEEDINGS

This volume, containing all the papers, addresses and discussions from the Society's 1965 conference at Eastbourne, is now published. The material it contains—industrial, domestic, administrative, road vehicle, etc.

—makes the report one of the most useful to be published for several years. Delegates to the Conference will have received their copies and other readers may obtain them from the Society at 25s. net (by post, 25s. 6d.).

THE RELUCTANT AUTHORITIES

Minister's Firm Letter

In view of its importance, and for the record, we give below the full text of the letter from the Ministry of Housing and Local Government (dated 14 January, 1966) to the local authorities to whom it applies. The letter, which is discussed in an editorial note on an earlier page, reads:

1. I am directed by the Minister of Housing and Local Government to say that he has been reviewing the progress made with smoke control since the Clean Air Act 1956 came into force. He has been particularly concerned to note the number of local authorities in the areas most polluted by smoke—the so-called black areas—who have done nothing, or very little, to promote clean air by making smoke control orders. Your authority, in particular, has not yet applied for confirmation of any smoke control order.

2. Air pollution is harmful to health, makes a town very unattractive and costs the community many millions of pounds each year; it is therefore in everybody's interests that determined efforts should be made to reduce it to a minimum.

3. Good progress has been made in the limitation of smoke from industrial sources. As a result of the exercise by local authorities of their powers under the Public Health Act 1936, the control by the Department's Alkali Inspectorate of processes registered under the Alkali Acts, and the co-operation of industry, industrial emissions have been much reduced over the last ten years. Moreover, these emissions are usually discharged from high chimneys, which greatly reduce pollution at ground level, where the air is breathed.

4. Progress with domestic smoke control has not been so satisfactory, except in areas where the authorities have been particularly energetic. It is estimated that over the country as a

whole three quarters of all the smoke produced at the present time comes from domestic sources; and this smoke is almost always discharged at a low level.

5. The Minister is therefore anxious that there should be no slackening in progress with domestic smoke control, and he considers it specially important that those authorities in the black areas who have taken little or no action should make their proper contribution to this aspect of the promotion of public health. The failure of a local authority to carry out its share of smoke control is not only hurtful to its own citizens; it is also unfair to neighbouring authorities and their ratepayers who spend money and effort to improve atmospheric conditions.

6. Some local authorities may have been deterred by doubts about the availability of smokeless fuels, particularly solid fuels. In this connection I am to remind your Council of the statement made by the Parliamentary Secretary, Ministry of Power, which is reproduced at Appendix A of the Department's Circular No. 13/65.

7. Like other social services, smoke control costs money; nevertheless, the benefit derived, both locally and nationally, far outweighs the cost. The benefit to the nation is reflected in the proportion which the Exchequer bears of the local authorities' grants to householders.

8. The Minister accordingly asks your Council to review their attitude to domestic smoke control; he hopes they will soon feel able to prepare and submit to the Department a planned programme of smoke control for their area and thereafter take steps to implement it. If a discussion with officers of the Department would be of advantage, the necessary arrangements will gladly be made.

9. I am to request that the authority

will inform the Department, not later than 31 March, 1966, of the results of their consideration of this matter. In the light of the response from the authorities to whom this and similar letters have been addressed, the Minister will be able to decide whether he should seek an opportunity of asking Parliament to make smoke control a statutory duty.

The Authorities Concerned

There are two lists of local authorities given as having received the letter. The first is that of the authorities in the black areas which have made smoke control areas, but which include less than 1,000 premises. This list is as follows:

County Boroughs: Barnsley, St. Helens.

Boroughs: Altrincham, Castleford, Darwen, Hartlepool, Mossley, Nelson, Pontefract, Tipton.

U.D.C.s: Arnold, Bolsover, Brownhills, Carlton, Darlaston, Eston, Great Harwood, Hindley, Kearsley, Kinds-grove, Long Eaton, Royton, Wath upon Dearne, Westhoughton.

Then follows the longer list of the local authorities in England, included in the list of black areas, which have not yet made any smoke control orders:—

County Boroughs: Darlington, South Shields, Tynemouth (withdrew all orders).

Boroughs: Accrington, Bilston, Epsom and Ewell, Farnworth, Rowley Regis.

U.D.C.s: Abram, Alfreton, Amblecote, Ashton in Makerfield, Aspull, Barrowford, Bedworth, Blackrod, Boldon, Brierfield (submitted a 75 acre proposal), Clayton le Moors, Conisborough, Coseley, Cudworth, Darfield, Darton, Dearne, Denholme, Dodworth, Eastwood, Featherstone, Fulwood, Golborne, Haydock, Horwich, Hoyland Nether, Hucknall, Ince in Makerfield, Kirby in Ashfield, Lees, Litherland, Little Lever, Longbenton, Mansfield Woodhouse, Mexborough, Normanton, Oswaldtwistle, Rawmarsh, Rishton, Royston, Ryton, Stanley (Yorks), Staveley, Tottington, Tyldesley, West Bridgford, Wombwell, Worsborough.

R.D.C.s: Basford, Rotherham.

OTHER OFFICIAL PAPERS

Smoke Control Area Estimates

Smoke Control Areas: Estimates and Final Costs is the title of Ministry of Housing and Local Government Circular No. 77/65, addressed to local authorities in England.

The circular gives revised arrangements for the submission of information about the cost of fireplace adaptations. The purpose is to simplify the handling of smoke control area orders, and two Tables are given, one for information on "Estimated Costs" and the other on "Final Costs". Totals only are required, and it is stated that to supplement the information the Department's technical officers will "from time to time visit selected local authorities and check that the

works in local authority dwellings on which the Exchequer contribution is claimed are eligible on the principles laid down by the Department."

Grant Arrangements—Scotland

Scottish Development Department Circular No. 66/1965, on Grant Arrangements is similar to the circular for England reviewed in some detail in our Autumn, 1965, issue (p. 16).

Suspensions

By Statutory Instrument the Minister of Housing and Local Government has suspended specified smoke control orders at Bolsover, Newton le Willows, and Sunderland. In each case the suspension is to 31 March, 1966.

LONDON CONGRESS TAKES SHAPE

Report on Progress

Excellent progress is being made in the preparations for the International Clean Air Congress to be held in London next October. The first congress of the new International Union of Air Pollution Prevention Associations, it is being organized on behalf of the Union by its United Kingdom member, the National Society for Clean Air. The Society is responsible for its finances, and has incorporated its own annual conference in this event.

A full programme is assured, and well over a hundred proposals for papers have been received and considered by the Papers Selection Committee. Over 90 have been accepted. They cover a wide and interesting range of air pollution subjects, and come from 20 different countries and international organizations. These are:

- Australia
- Canada
- Council of Europe
- Czechoslovakia
- Finland
- France
- West Germany
- German D.R.
- Israel
- Italy
- Japan
- Mexico
- Netherlands
- Nigeria
- Poland
- South Africa
- Sweden
- United Kingdom
- United States
- World Health Organization

In addition to the papers there will be separate "Continental Reviews". In numbers, the principal contributors come from France, West Germany, the U.S.A. and the U.K.

The working sessions will be numbered 2 to 8, with up to 25 papers, grouped under appropriate headings,



discussed at each. This means, as was the case at the 1959 conference in London, that the papers—to be printed and distributed in advance, of course—will not be introduced by their authors individually, but by rapporteurs. Then there will be discussion on the group as a whole, with opportunity for authors to reply.

All the meetings—in the Horticultural Hall, Vincent Square, Westminster—will have simultaneous translation facilities throughout, in English, French and German.

The congress will have to pay for itself for its major outgoings, but the registration fee for delegates has been kept as modest as possible in the face of the considerable expenses that will have to be borne. It will be £6 10s., and will include the printed papers, the volume of which will constitute Part I of the Proceedings of the Congress. Part 2, which will contain rapporteur's reports, discussions, and addresses, will be published later, and will be an optional addition to the fee.

Reception at Guildhall

The social activities of an international congress are important in the way they can build up friendships and understanding among the participants. We are glad to be able to announce that what will be the social highlight for many will be an evening reception by the Lord Mayor of London in the historic Guildhall. Those who attended a similar occasion at the Diamond Jubilee Conference will remember it well.

There will also be a Congress Dinner, with dancing and cabaret, at the Connaught Rooms, and it may be possible later to announce other events.

Friday, 7 October, will be devoted to visits, full details of which will be announced later. Some of these may be of special interest for overseas delegates, but many will be of interest in one way or another to our own members and other U.K. delegates.

Finally, the Clean Air Exhibition, to be held in the New Horticultural Hall (behind the old hall) is already assured of full success. It will have a truly international flavour, with a

number of overseas exhibitors, including a "joint venture" West German stand, and, we hope a similar stand from France.

Readers who do not receive communications as members of appointed representatives of the Society, but who wish to be certain of obtaining the full programme and other papers, now in preparation, are advised to write to the Society asking for these to be sent to them as soon as they are issued. Certain tickets may have to be limited in number, and the "first come, first served" principle will in fairness be applied.

Fuel Oil Desulphurization

The January issue of *Power and Works Engineering* (London) contains an interesting article on this subject, adapted from an article in *Power* (U.S.A.).

It is pointed out that the restrictions imposed on the sulphur content of residual fuel oils by many national and municipal authorities to minimize atmospheric pollution may well lead to the demand for a substantial reduction in sulphur content to be effected during processing at the oil refineries. Residual fuel oil is obtained by blending the heavy residual products of the refining process, which may contain sulphur concentration from 5 to 6 per cent, with lighter products. Sulphur content varies greatly in residual fuel oils and is determined largely by the sulphur content of the crude oil from which they are obtained.

A table shows the considerable variations in the sulphur content of crude oil, ranging from 0.09 per cent for Zarzaitine and 0.20 for Louisiana oils, to 4.3 per cent for Kuwait oil.

After referring to the controversy about the harmful effects of SO_2 in the atmosphere, and mentioning that "a number of government and public authorities throughout the world have legislated against the burning of high

sulphur content fuel oils", the article continues:

"If blending does not achieve the necessary results, then obviously more radical methods must be developed. Desulphurization carried out at the oil refinery would be a major undertaking, and although the leading international oil companies agree that it is technically possible, they also agree that it is not an economic proposition at present. The reaction of these companies to the idea in general ranged from definitely negative to slightly encouraging. Some felt that residual oil is so cheap—at least in the United States—that refiners are trying to reduce, or entirely eliminate, production of heavy fuel oil. Others felt that, because atmospheric pollution by SO_2 is not likely to be solved by any inexpensive means, the method selected might well be desulphurization.

"Whilst such a method must obviously increase the cost of fuel oil, this increase must be weighed against the operational savings and advantages to be gained by the use of low sulphur content oil. These savings, obtained from less maintenance and replacement of corrosion, and a reduction in the need for additives, together with the advantage of less

atmospheric pollution, may well tip the scales in favour of desulphurization."

Catalytic Removal

The Esso Research and Engineering Co. have determined the cost of reducing the sulphur content of fuel oils from Kuwait and Arabia to 1 and 2.5 per cent by catalytic desulphurization. The process uses hydrogen, at the low rate of 45 to 55 ft.³/lb. sulphur removed, and a medium quality catalyst; the catalyst can be used for about two years with regeneration every four to six months.

The Esso report says that it would pay to treat the entire charge of crude oil rather than restrict treatment to the residual fuel: "By desulphurizing before crude distillation, corrosion of refinery equipment is greatly reduced, and capital cost savings are possible in a new refinery since it can be

designed for low rather than high sulphur content. By treating the residuum in the crude oil, the problem of handling a heavy viscous oil is minimized."

The article continues by reference to a computer study of removal more recently completed by the Bechtel Corporation, U.S.A. A graph is given showing how cost increases with extent of sulphur removal, and from this it can be seen that the cost of residual fuel oil obtained from Kuwait crude oil is increased by nearly 25s. per ton when the sulphur content is reduced to 0.5 per cent—an amount considered as acceptable.

The conclusion reached is that "regardless of the high cost, desulphurization may ultimately be the least costly and bothersome solution to corrosion and air pollution problems associated with oilfired installations."

Correspondence

SMOKE CONTROL AND THE OLD AGE PENSIONERS

*The Editor
Smokeless Air*

Sir:

The special case of the cost difficulty of the old age persons was discussed in your Winter, 1965, issue on page 92. The local paper here—the *Accrington Observer*—has published in the past two months letters from old age persons. The tenor of these letters is:

1. Leave the OAP's alone;
2. They cannot afford smoke control.

These points of view can be well understood and must be reckoned with. These can be one of many reasons for the delay of local authorities making smoke control orders, especially as many OAPs serve on local authority councils.

Your solution of improved pensions for all is no doubt the ideal solution,

but greater progress in smoke control would be obtained if it were recognized that it is more costly to burn smokeless fuels and keep in the fire than to burn coal on the fire. Many an old age person's coal fire is so small that the heat emission is exceedingly meagre, but the apparent piece of comfort of the red glow from a small fire is not obtained from solid smokeless fuels. Again, the price of premium fuels in comparison with that of coal will cause a resistance to those fuels. The cause of clean air must be made more attractive to this large body of the population.

Perhaps some definite research on this problem could be made by the Society or by another organization on its behalf. The resolving of this difficulty would be of great assistance to all.

Yours, etc.,

J. S. PALK,
Public Health Inspector,
Church Urban District Council.

Incapacity for Work

The Significance of Air Pollution

Report on an Inquiry into the Incidence of Incapacity for Work. Part II: Incidence of Incapacity for Work in different Areas and Occupations. Ministry of Pensions and National Insurance. H.M.S.O. £2 2s. net.

THIS important report, which runs to nearly 400 foolscap pages, is part of the results of an inquiry made by the Ministry of Pensions and National Insurance. It is an analysis of the sickness records of a sample of the insured population, made for the purpose of comparing the nature and extent of incapacity for work in different occupations and in different areas. In reply to a question in the House of Commons on 30 January, 1961, the then Minister of Pensions said:

“The results of this inquiry should provide research workers with a picture of the distribution of illness in the working community which will indicate those groups of people which most merit further study to determine the causes of such illnesses as bronchitis, mental disorders, and rheumatism and arthritis, which between them account for more than a quarter of the sickness recorded among the working population.”

The inquiry was the outcome of earlier discussions between the Ministry, the Medical Research Council and the Ministry of Labour. The importance of the subject is indicated by the following figures, quoted from the report:

Nearly 21 million people in Great Britain are insured for national insurance benefit.

Every year about 9 million claims for national insurance benefit are received.

The total number of weekdays of incapacity is of the order of

280—290 millions a year (plus another 20 millions or so for injury benefit).

The cost to the National Insurance Fund of sickness benefit is running at the rate of about £220 millions a year.

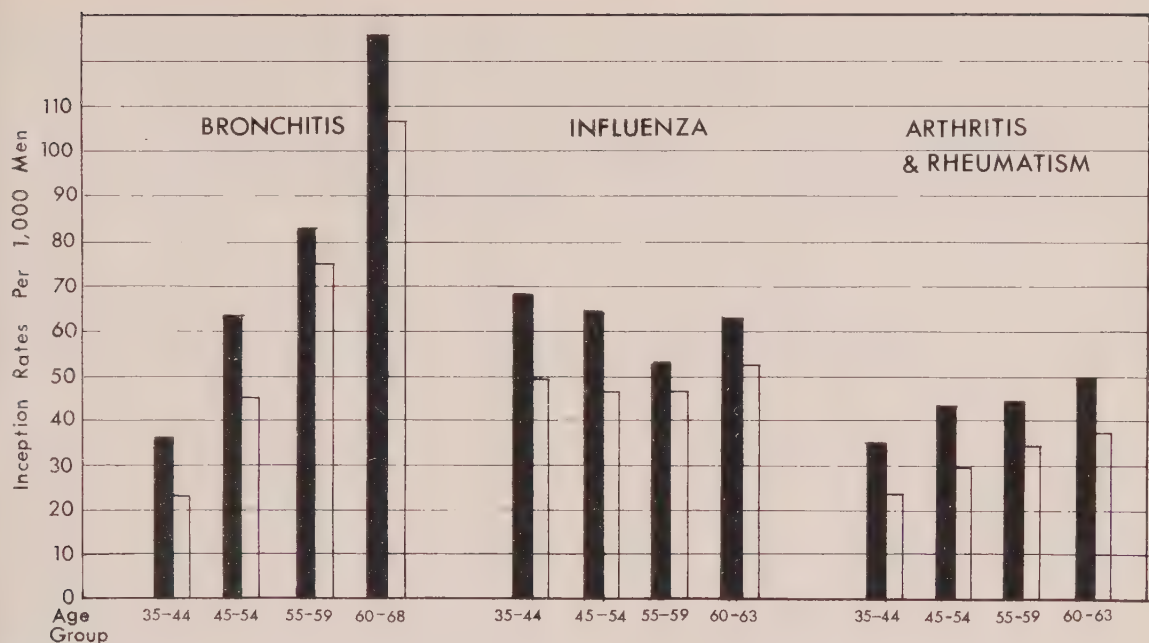
The three main groups of disease causing incapacity are referred to in the introduction. Leading by a wide margin is bronchitis, accounting for 35—40 million days lost, and costing the Fund £28 millions a year. Next comes arthritis and rheumatism (20 million days) and psychoses and psychoneuroses (27 million days). Special consideration is given to these groups.

It is pointed out that the inquiry “was not one which could determine whether or not a particular type of illness was caused by environment or occupation. It was simply designed to provide a broad picture of the extent of incapacity for work in different areas and occupations which might warrant further medical research. Special consideration was given to the three groups of diseases which caused a great deal of incapacity for work: bronchitis, arthritis and rheumatism, and psychoses and psychoneuroses.”

Relationship with Air Pollution

Air pollution is the only environmental factor to be given specific, detailed attention, and chapter VI of the report is the result of a study of the data obtained in the inquiry made by the Warren Spring Laboratory in relation to observations on air pollution made at the same time in connection with the National Survey.

The air pollution observations used were confined to sites of one particular type, namely areas of high population



■ High winter smoke (mean 365 $\mu\text{g}/\text{m}^3$) □ Moderate winter smoke (mean 175 $\mu\text{g}/\text{m}^3$)

Inception rates in Great Britain in relation to High and Moderate Winter Smoke, for three diseases and four age groups (Fig. 25 of the Report)

density, and only towns or groups of towns where a number of observations had been made have been included. The Ministry extracted the relevant data from their tables and calculated the degree of incapacity from certain diseases in each of the areas covered.

For comparisons over the country as a whole observations from one type of site only were necessary, but Greater London was considered separately—here, unlike different districts throughout the country, geographical and climatological differences were negligible, and socio-economic factors, closely linked with air pollution, were of importance. The analysis of the incapacity data and the air pollution data is discussed in detail in the report, with tables and diagrams. We reproduce three of the diagrams as examples. It would be difficult to summarize this except in the brief manner in which the report itself summarizes this chapter, and this may therefore be quoted in full:

“Examination of the findings of the Inquiry in relation to air pollution data showed that for Great Britain excluding the Greater London conurbation there was a significant correlation

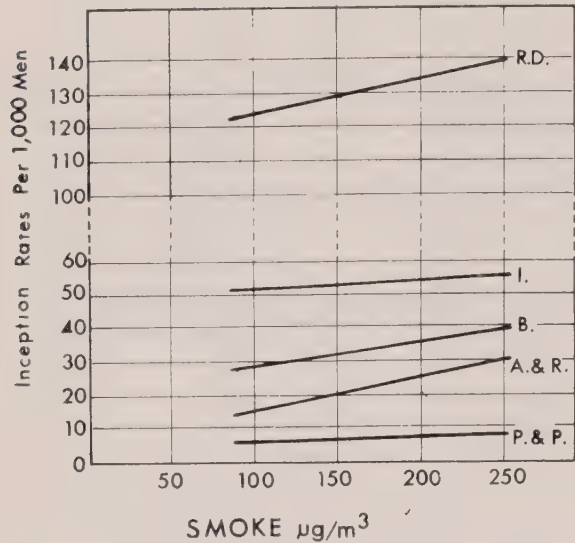
between bronchitis incapacity in middle-aged men (ages 35—54) and the average levels of smoke (suspended matter) and sulphur dioxide in high-density residential districts. South Wales had far more bronchitis incapacity than could be accounted for by the air pollution found there. In the Greater London conurbation, which was studied in more detail, and where air pollution levels were therefore related more closely to socio-economic factors, there was a significant correlation between bronchitis incapacity and both forms of pollution for all age groups taken together, and for men aged 35—44 and 55—59. There was also, in both studies, more incapacity from arthritis and rheumatism in heavily smoke-polluted areas. Influenza incapacity was greater in those areas with higher pollution levels over Great Britain as a whole, but this did not apply within the Greater London conurbation, nor was there in this area any associations between pollution and psychoses and psychoneuroses.

A follow-up of the present analysis, when more data is available from the National Survey, is foreshadowed. In

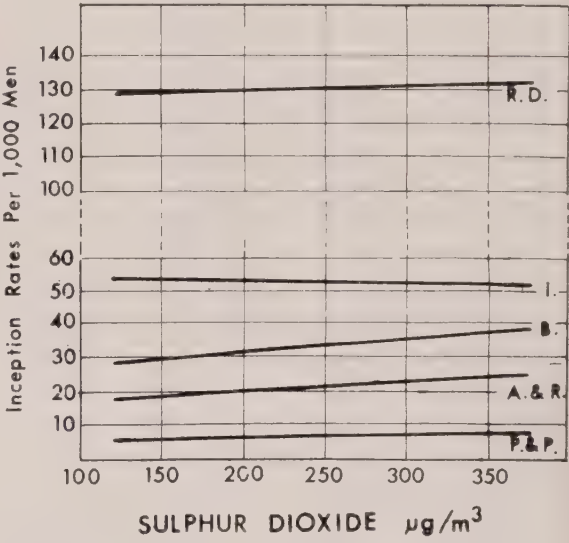
this, it is said, it may be possible “to augment the present study by another in which not only the certificates of incapacity but also mortality rates and data from other sources such as hospitals and general practitioners

might be compared with pollution levels in selected areas throughout the country.”

(The report is the subject of an editorial comment on page 172).



Inception rates in Greater London in relation to Winter Smoke (Fig. 34)



Inception rates in Greater London in relation to Winter Sulphur Dioxide (Fig. 35)

(R.D. Respiratory diseases; I. Influenza; B. Bronchitis; A & R. Arthritis and Rheumatism; P. & P. Psychoses and Psychoneuroses)

What They Say

The publicity afforded to the vital subject of clean air is in itself a healthy sign. The work of this Eastbourne Conference is a credit to all concerned. Britain is facing up to the problems involved in combating air pollution, from whatever source it may derive, and it is encouraging to know that so many other countries are doing the same.—From a full report of the Eastbourne Conference in *Nature* (1 January, 1966).



The main threat of course is to life itself, and the winter number of *Smokeless Air*, the journal of the National Society for Clean Air, ranges across the globe with examples of the grave dangers resulting from

air pollution. Britain is clearly not the only country with this problem . . . This year an international Clean Air Congress will take place . . . let us hope that 1966 will see a great effort by local authorities and the general public to rid Britain's skies of the choking pall which hangs overhead.—From a leading article in the *Evening Standard* (3 January, 1966).



Let us hope that this is the year . . . in which the people who want to clean up the TV air turn their attention to something useful—cleaning up the real pollution of the real air we all have to breathe.—From a leading article in the *Daily Mail* (1 January, 1966).

INTERNATIONAL SECTION

U.S.A.

CLEAN AIR ACT AMENDED

On 20 October, 1965, President Johnson signed a new Act (P.L.89-272) by which the Federal Government assumed major new responsibilities for the prevention and control of air pollution. This legislation amends the Clean Air Act of 1963 by giving the Secretary of Health, Education, and Welfare authority to:

1. Control air pollution from new motor vehicles.
2. Take action to abate air pollution which originates in the United States and endangers the health or welfare of persons in neighbouring countries.
3. Investigate and seek to prevent new sources of air pollution from coming into being.
4. Construct, staff, and equip facilities needed by the Department to carry out its increased responsibilities under the amended Clean Air Act.

The President's signature also brought into being the Solid Waste Disposal Act, which authorizes the Department of Health, Education, and Welfare and the Department of the Interior to invest more than \$92 million over the next four years in research and development activities, demonstration projects, surveys, and technical and financial aid to State, regional, and local agencies to assist in the planning, development, and conduct of solid waste disposal programmes. The two departments will initiate and accelerate a national programme to develop and apply new methods of solid waste disposal that will not only minimize the environmental spoliation resulting from present inadequate waste disposal

practices, but will also permit the recovery of potential resources in solid wastes.

It is said, in a brochure describing the new legislation, that the two new Acts "provide important new tools to help forge a comprehensive attack on the growing national problem of community air pollution.

The Vehicle Exhaust Control

The most interesting part of the Clean Air Act Amendments is that relating to pollution from motor vehicles. During hearings on the bill testimony was presented by officials of the automotive industry. These witnesses announced that, if required by Federal law, they would be able to equip all automobiles with exhaust pollution control systems beginning with the 1968 model year. Although the Clean Air Act Amendments do not set a specific date by which time Federal standards on motor vehicle emissions are to become effective, the Department of Health, Education, and Welfare has notified Senator Muskie (who introduced the bill) that emission standards will be made applicable to gasoline (petrol) powered vehicles and engines by the 1968 model year (autumn, 1967).

It is stated that the provisions of the Amendments dealing with the motor vehicle are designed to achieve uniform national control by limiting the emission from all new motor vehicles introduced into interstate commerce, whether manufactured in the United States or manufactured abroad. Because motor vehicles are a ubiquitous source of air pollution, moving freely

from city to city and from coast to coast, anything less than nationally uniform control would fall short of the need.

The H.E.W. Secretary is authorized to establish standards for any emission judged to be injurious to public health or welfare. Once the Secretary has promulgated such standards it will be unlawful to introduce a new motor vehicle engine into interstate commerce which fails to comply with the standards announced by the Secretary or to render inoperative a control device on a new motor vehicle or engine before delivery to the ultimate purchaser. Such acts are punishable by a fine of not more than \$1,000 for each offence.

The standards may be revised from time to time in response to new knowledge and technological improvements, and the Secretary is required, on request, to test any prototypes to determine whether they conform to control standards.

This new legislation, it is stated, provides the basis for uniform national control of automotive smog, a problem which individual cities and states cannot adequately deal with. Moreover, it gives the H.E.W. department the legal means of securing control of any and all types of pollutants discharged by motor vehicles—those involved in the formation of photochemical smog as well as any others judged to present a hazard to human health or welfare.

Standards Proposed

Later information received states that proposals for Federal standards for vehicle emissions have now been issued, on which comment has been invited. They prescribe maximum allowance rates for the discharge of hydrocarbons and carbon monoxide, and would apply to imported cars as well as to cars made in the U.S.

The proposed standards for engines of 140 or more cubic inches cylinder displacement would limit the tailpipe exhaust discharge of hydrocarbons to an average of not more than 275 parts

per million of exhaust and carbon monoxide to an average of 1.5 per cent by volume over the entire life of the vehicle. The average car without an exhaust control system emits approximately 800 parts per million of hydrocarbons and 3.5 per cent of carbon monoxide from its exhaust. Vehicle life is calculated at 100,000 miles for the purposes of the standards.

Engines having less than 140 cubic inches displacement, primarily those used in small imported cars, will be limited to an average of 375 parts per million of hydrocarbons and 2.0 per cent of carbon monoxide over a vehicle life of 100,000 miles. Less stringent standards were developed for smaller engines because they discharge a considerably smaller volume of air pollution than do larger engines.

Pollution Dilution

Latest idea for diluting automobile smog: half-mile-wide "greenbelts" along both sides of our freeways, where no one, even a private homeowner, is allowed to burn anything.

"People near freeways are now breathing air that has been diluted with less than 1,000 parts of fresh air to one part of auto exhaust," says Prof. Albert F. Bush of the University of California at Los Angeles. For a sound air environment, we believe that the proportion should be at least 2,000 to 1."

To get the right mixture around an eight-lane freeway "at least one-half mile of open area on each side would be needed in which all burning processes, even from private homes, are excluded," says Prof. Bush, who heads the environmental laboratory of the UCLA engineering department.

The open spaces, converted to parks, could make for a healthier air balance in two ways. The unpolluted fresh air of the parks could dilute and diminish the smog buildup above the freeways, and the green vegetation would actually remove pollutants and restore oxygen to the atmosphere.—From *Science News-Letter*, Washington, D.C.

COMPREHENSIVE NEW ACT

We have received a copy of the new Atmospheric Pollution Prevention Act, 1965, of the Republic of South Africa. It appears to be the most comprehensive single piece of legislation adopted by any country. It is divided into six parts:

1. Establishment of a National Air Pollution Advisory Committee and Appeal Board and Appointment and Powers of Officers.
2. Control of Noxious or Offensive Gases.
3. Atmospheric Pollution by Smoke.
4. Dust Control.
5. Air Pollution by Fumes emitted by Vehicles.
6. General Provisions.

Basically, and frequently in its details, the provisions relating to smoke are akin to the British Clean Air Act, while the control of noxious or offensive gases is similar in its scope and methods to the Alkali &c. Works Act. The Advisory Committee that can be set up is like our Clean Air Council.

There are, however, many differences from our own legislation, many clearly arising because of the very different conditions in South Africa. Thus the Minister (of Health) appoints a chief air pollution control officer and as many inspectors as may be required. Such inspectors may include inspectors of mines, explosives and railways, and officers of local authorities—all with the approval of the employing authority, and for functions that will be specified on a certificate.

Both control of noxious or offensive gases and of smoke applies only in specified control areas, to be declared by the Minister after consultation with the Minister of Economic Affairs. For noxious and offensive gases processes are scheduled, as in the U.K., and certificates are issued if the inspectorate is satisfied that emission standards will be observed.

Smoke is dealt with by requiring (in

areas specified) new fuel-burning installations to be "as far as is reasonably practicable, capable of being operated continuously without emitting dark smoke or smoke of a colour darker than may be prescribed by regulation". Grit arrestment appliances must be used with plant burning pulverized fuel, or fuel in any form at a rate of more than 250 lb. per hour, or with any process subjecting solid fuel to the application of heat. A section relating to chimney heights is similar to S.10 of the British Clean Air Act, slightly elaborated.

A section on smoke nuisances provides that if the occupier of any premises complains of smoke from other premises, and if the local authority is satisfied that it is a nuisance which is prejudicial to health or adversely affects the reasonable comfort of the complainant, then a notice of abatement may be served.

Very wide powers are given to local authorities to make regulations for the control of smoke emissions, listed under eleven sub-sections. Very briefly indeed these regulations may: prohibit smoke emissions that exceed permitted limits; prohibit the installation of non-approved appliances; authorize the removal of unauthorized plant; prohibit the sale of unapproved solid fuel; require the keeping of fuel records; provide for the inspection of appliances; require the installation of smoke recorders, etc.; prescribe requirements for heating and cooking facilities; provide for the setting up of local smoke control committees; prescribe the procedure for appeals; and finally make regulations "generally for the effective control of smoke from any premises".

Powers are also given for the establishment of "smoke control zones". Orders may be made, and need to be confirmed by the Minister, as in the U.K., but there is an essential

difference in that it is an offence, not just to emit smoke, but to emit "smoke of a darker colour or greater density or content than is specified in the order".

Dust Control

Part 4 of the Act, on dust control, applies to areas that have been declared to be dust control areas. It controls dust from industrial processes generally, and not specifically from fuel burning operations. The offence is when there is "deposited or caused or permitted to be deposited on any land a quantity of matter which exceeds, or two or more quantities of matter which together exceed, twenty thousand cubic yards in volume, or such lesser quantity as may be prescribed, and which in the opinion of the chief officer causes or is liable to cause a nuisance to persons residing or present in the vicinity . . ."

The control of pollution from vehicles is covered by a section which enables the Minister to make regulations (after he has received a report) prohibiting the use on any public road, in areas which have been declared to be applicable, "of any vehicle from which fumes specified in such regulations or fumes which are of a darker colour or greater density or content than is so specified are emitted". A local authority is able to authorize any person in its employ to detain and inspect vehicles.

Malta, G.C.

NEW SOCIETY MAKES PROGRESS

The new National Society for Clean Air—Malta, which we have been glad to give some assistance to, has published a first progress report. From this its first year appears to have been most active and very successful in arousing public opinion on the problems that affect the island, and particularly that from the drydocks. Good publicity was secured on radio and television and in the press. This evoked a round of parliamentary questions.

A letter to the Prime Minister proposed *inter alia* the drafting of legislation on the lines of the U.K. Clean Air Act. In reply, it was said that the Government has under urgent consideration the drafting of legislation intended for the control of smoke emission, and that the Society and other parties would be consulted at the appropriate time.

Nevertheless, the Society is continuing to make representations for temporary measures to be taken to stop flagrant abuses that have hitherto been left unchallenged.

West Germany

SMOG PLAN

For several parts of the Land of Nordrhein-Westfalia, there is the danger of excessive air pollution which might cause damage to the health of the inhabitants. In these areas, the measuring instruments for the first measuring programme of 15 May, 1963, were installed in particularly great numbers. A regulation issued on 2 December, 1964, makes it possible to apply traffic reductions during unfavourable weather conditions.

The smog plan now provides that if the concentration of sulphur dioxide in the air exceeds 2.5 mg. per each cubic meter of air during unfavourable weather conditions, warning stage 1 is announced, meaning an early warning. At such a stage, reduction of private car traffic and surgical operations is recommended.

Warning stage 2 is announced when the concentration of sulphur dioxide amounts to 5 mg. per each cubic metre of air and when there is no prospect that the weather will change for the following 24 hours.

The warnings are announced by the Minister for Social Affairs and Labour on radio, TV and in the newspapers. A number of enterprises are obliged to change to fuel and raw materials that do not contain much sulphur. The reduction of car traffic in the endangered areas becomes obligatory.

It must not be overlooked that

especially during winter not only industry contributes to air pollution but also the heating of private houses. In many cases the high chimneys of industrial plants and district heating systems surpass the inversion sphere whereas the chimneys of family houses let out the smoke just above the roofs from where it is pressed down to the roads.—From *Unschau in Wissenschaft und Technik*.

DISTRICT HEATING REDUCES AIR POLLUTION

The connected capacity of district heating installations in Western Germany has been increasing over the past six years at an annual rate of 17 per cent and there is no sign that this pace is slackening.

Mr. Schultz of the West Berlin Power Company (BEWAG) told a recent international conference organised by the Vereinigung Deutscher Elektrizitätswerke at Duisburg that almost the entire increase had come from waste heat from electricity generating stations using either the intermediate take-off condensing turbine or gas turbines. He predicted that in the future much of the district heating load would be supplied from nuclear power. More than a quarter of a million therms per hour was currently being supplied from district heating power stations.

The main impact of this increased use of district heating in Germany (several speakers pointed out) has been in the virtual abolition of air pollution in the centre of many German cities. It was suggested that in future motor vehicles would be the only source of pollution, as all domestic heating would be from district heating using power stations sited some distance from densely populated areas. Another speaker suggested that group heating schemes should be considered as intermediate stages and should eventually be connected up to larger networks supplied from a power station.—*Electrical Review* report.

Mexico

SMOG HIDES POPOCATEPETL

On a clear day you can see Popocatepetl and Iztaccihuatl, the twin volcanoes that stand guard over the Valley of Mexico and which are proudly pointed out to tourists.

But the clear days are fewer and fewer, and many visitors to Mexico City never glimpse the famous snow-capped peaks because of the smog.

Unbesmogged days are so rare that when one occurs residents remark on how nice it is to be able to see Popocatepetl and Izta again.

The smog problem has been piling up in this cup-shaped valley for several years—ever since Mexico City became the focal point of the country's industrialization in the 1950's. Today more than 60 per cent of the nation's industry is located within the valley. There has been official talk of decentralization of industry for three years, but in 1965 some 150 new smoke-belching industries were set up in this area.

A drive through the major industrial zones, which form an east-north-west horseshoe around the city, can be an interesting, but unpleasant experience on a sultry day.

Since there are no zoning laws, one need not search out smog sources. Black smoke billows from small factory stacks only a few blocks from the downtown business district and even within areas that are predominantly residential.

Motor-vehicle fumes add to the chemical-laden haze. Mexico City contains 360,000 autos, trucks and buses—one-third of the country's total registration. A large portion of the trucks and buses are diesel burners that lay a poisonous smoke screen in their wake. Most of the other commercial vehicles are vintage models that obviously need ring jobs or some other mechanical ministrations.

This concoction of smoke and fumes frequently becomes weighed down with heavy morning fogs, pushing the

ceiling to zero and delaying air-traffic until either the sun burns off the blue-black pallor or a propitious breeze carries it away.—From an article by Patricia Nelson in *Christian Science Monitor*.

Australia

POLLUTION IN BRISBANE

Queensland's Air Pollution Control Officer (Mr. Alan Gilpin) recently described "fall out" in two western Brisbane suburbs as "amongst the worst I have seen. Mr. Gilpin had just been on a two-hour inspection tour of the Oxley and Darra area.

He toured the area with Labour and Industry Minister (Mr. J. Herbert), the City Council Alderman G. Thomson, and Oxley Progress Association officials.

(Mr. Gilpin, an air pollution expert, arrived from London last August to take up the new post with the State Government of Queensland Air Pollution Control Director).

The group saw evidence of extreme air pollution.

There were:—

House roofs caked with a concrete-like substance.

Roof gutters filled with solid one-and-a-half-inch thick layers of this substance.

Trees and gardens suffocating under a thick covering of what appeared to be cement dust that felt like sandpaper.

Newly painted walls already coated with this dust.

Cars with their roof and bonnet paint completely stained by the "fall-out".

What they did not see was the thick coating of black soot-like substance that covers the district at intervals.

They didn't see it, but residents were loud in their complaints about it.

Oxley Progress Association secretary (Mr. Tom O'Neill) said the area was subject to severe pollution from a cement works, three brickworks, and other district industries.—*Brisbane Courier Mail* report.

Argentina

CONGRESS IN BUENOS AIRES

We are not sure exactly how many delegates attended the international air pollution congress in Argentina in November last, but there appeared to be about a hundred from Argentina itself, and a score or so from other countries — the latter coming as the guests of a generous government. The programme listed some eighty papers, covering a wide field of air pollution subjects. They were divided into two sections, the meetings being held simultaneously, to hear the papers read or reported upon.

We have not yet received copies of the papers, so that it is not possible at present to describe them or to give abstracts.

The event was organized by the Asocación Argentina Contre la Contaminación del Aire, one of the members of the International Union of Air

Pollution Prevention Associations, and as the delegates included all the members of the I.U. Executive committee, it was possible to hold meetings during the course of the congress. It having been agreed that the first conference of the I.U. should be held in London in 1966, the President of the British N.S.C.A. became first President of the Union, and the Director of the Society the first Secretary. In the absence of Sir Alan Wilson, Mr. Marsh presided over a plenary meeting of the congress at which the several members of the Executive spoke on their respective associations and the situation in their countries — Dr. Rispoli for the Argentine, Professor Roussel for France, Dr. Stephany for West Germany, Mr. Taga for Japan, and Dr. Barthel for the U.S.A. The congress was especially

valuable for enabling the I.U. members to get to know each other better, and to make themselves known to other delegates.

The officers of the Argentine Association, and especially Dr. Rispoli, the President, and Dr. Torti, the Secretary, ably and charmingly assisted by their ladies, were untiring in their hospitality and friendliness and in their efforts to give the congress a sense of international amity. A social highlight was a visit to the famous Colon Theatre, where a ballet—*Coppelia*—was put on especially for the delegates to the congress. A visit to an Esso oil refinery about forty miles from Buenos Aires provided an excellent opportunity to see something of the countryside.

Buenos Aires, to one visiting it for the first time, was unexpectedly European in many of its characteristics. It is one of the world's largest cities, and although visible air pollution was not very evident—it was early summer—it is obvious that for such a vast conurbation, with many

straight but narrow streets and a traffic problem second to none, vehicle pollution at least is a question not to be disregarded. The motor traffic, with its speed, the (to a stranger) eccentricity of the driving, and the sustained exuberance of its horns and hooters, needs a lot of getting used to.

Like so many other cities, B.A. is having to cope with a big movement of immigration from the rural areas, and there are problems of housing, planning and assimilation. But the city has an atmosphere of eagerness and energy, its people are delightful, and there are many fine buildings and a wonderful great central park. Time did not permit any thing but a glimpse of the great port area, the docks and waterfront, which enable the city to be one of the busiest ports in the world. European though it may seem in many respects it rejoices in a wealth of jacaranda trees in its streets and squares, and these, as luck would have it, were in full flower, canopies of soft blue, during the time of the congress.—A.M.

DARK SMOKE EMISSION FROM DOMESTIC CHIMNEY

For a total of one hour twenty minutes Public Health Inspector Mr. K. S. Wilson kept watch on Mr. Barry Wright's chimney in Colne Road, Huddersfield.

The result was Huddersfield's first prosecution under Sections 1 and 27 (1) of the 1956 Clean Air Act for emitting dark smoke from a private dwelling house not in a clean-air zone.

The defendant, who wrote to Huddersfield Borough Court yesterday pleading guilty to being the occupier of a building from the chimney of which dark smoke was emitted on two occasions—October 26 and November 5—was fined £1 for each offence.

Mr. J. Payne, prosecuting, told how on 5 November, Mr. Wilson kept the chimney under observation for 20

minutes. For 14 minutes he had seen dark smoke, for 5 minutes 30 seconds faint smoke and for the rest of the time no smoke.

Mr. Wilson also kept the chimney under observation for an hour on 26 October. This time there was dark smoke for 30 minutes 15 seconds, faint smoke for 13 minutes 30 seconds and no smoke for 16 minutes 15 seconds.

Defendant told Chief Public Health Inspector Mr. F. Ellam, "The house is a very cold one and burning coal does not warm it enough and burning rubber warms it better than burning coal. I have been burning it a bit now, but I now burn mostly wood and coal." —Report from *Huddersfield Examiner*, 11 January, 1966, which adds that it was later informed that Mr. Wright had been burning gasmasks.

Clean Air and The N.C.B.

Address by Sir Humphrey Browne

The Deputy Chairman of the National Coal Board, Sir Humphrey Browne, C.B.E., addressed a well-attended meeting of the South East Division of the Society in London on 24 January.

Most of Britain's coal was now being burned in conformity with the provisions of the Clean Air Act, said Sir Humphrey. The bulk of the bituminous coal which was burned smokelessly was used in automatically-fired power station and industrial boiler plant.

It could well be said that the N.C.B. had a vested interest in Clean Air, he declared.

Industrially, they supported the campaign because the emission of smoke meant inefficient burning, and this could mean loss of business. The Board's interest in Clean Air from the domestic chimney was because of their deep and increasing commitment in the production of smokeless fuels.

Some of the effort in the development of manufactured smokeless fuels was directed to the growing demand for solid fuel central heating systems, already served by various cokes, and by the naturally smokeless coals mined mainly in South Wales. But the Board had also set themselves the more difficult task of increasing the volume and range of smokeless fuels suitable for open fires.

"Not to provide for the open fire would condemn any reasonable prospect of securing Clean Air", said Sir Humphrey, "not only because there are millions of existing fireplaces, but also because people have a deep-seated preference for the open fire. And who shall blame them? The open fire is the most civilised comfort in the world."

Energetic development planning by the Board and the private producers of smokeless fuels had caused the Government to cancel their warning of only three years ago, that there

would be a shortfall of about two million tons of open fire smokeless fuel by 1970.

At Coventry Colliery the Board had built a plant to produce 660,000 tons a year of a new super fuel "Homefire". The first stream, to produce 220,000 tons a year, was already commissioning, and the second stream would start in the summer. Full production at the plant should be reached by the winter of 1966/67.

Another new Coal Board fuel, "Roomheat", could be made from a wider range of coals than that used for "Homefire", but the process was similar. This fuel was designed for roomheaters, but market trials had proved that it burned equally well in the open fire. The first "Roomheat" plant, at Markham Main Colliery, in Yorkshire, was now commissioning, and it would produce 240,000 tons a year when fully operational. More plants would be built as the market expanded.

For closed appliances, a new fuel called "Multiheat" was in production at a new 110,000 tons-a-year plant at Cardiff which could be extended to produce up to 330,000 tons.

Private producers of "Coalite" and "Rexco" were also substantially increasing their production of smokeless fuels.

"With the development of new fuels and new appliances the critics, who continue to condemn the open fire in their obstinate way, have become the new reactionaries" said Sir Humphrey. "People could now retain civilised comfort and friendly warmth with a living fire which was efficient, economical and clean."

The address was followed by an excellent discussion, with a number of questions being put to Sir Humphrey. The Chairman of the Divisional Council, Mr. Combey, presided.



Avian Air Pollution

By

J. L. BURN, M.D., D.HY., D.P.H.

Medical Officer of Health—Salford

I SHALL never forget seeing in student days, a man suffering from Psittacosis, my first case of a disease transmitted by birds to man. He had had only indirect contact with a parrot—and the infection almost certainly would have been by the inhalation of contaminated air. We too often forget that harmful bacteria, viruses, fungi, pollens, and yeast organisms are a form of air pollution which may cause havoc to health to susceptible people.

In addition to these, pathogenic organisms in pigeon droppings, another hazard appears to have come to light—the harm caused by air pollution from dried faecal matter. Specimens from pigeon excreta show a very high content of uric acid—American authors suggest up to 80

per cent of faecal matter. In this city, estimates of uric acid in the air have been made, following the techniques based on Folin's methods and described by Braverman, Theophil, Masciello and Smith in the laboratories of the Department of Air Pollution Control, New York.

Care was taken in the choice of site in order to avoid contamination from other sources such as animal excreta—the fourth floor of a new health department which is near an old building which has long had a pigeon population in the roofs, at half the height of the fourth floor. The sampler, familiar to many in air pollution measurement, was operated for seven days on each of seven weeks. On an average 123 cm³ each week was drawn through. The concentration of



Being filmed with the pigeons in Trafalgar Square

uric acid in micrograms was discovered in significant amounts in all samples (varying from 0.03 to 0.18 micrograms per cubic metre) and was not dissimilar to the New York City figures. Even if one allows an error of say 20 per cent, the amount of avian faecal matter can be equated directly from the uric acid.

The thought that some of us may breathe some dried faecal matter from the street pigeon (or the starling or the gull) is hardly an attractive one. We are all acquainted with the analogy of dried tuberculosis sputum and the possibility of the spread of infection comes to mind. Following indiscriminate expectoration, the sputum quickly dries in conditions of moving air and sunshine. Droplet nuclei can rise in the air and infect others. Particularly are they a hazard to toddlers and young children, whose respiratory tract is but a little distance from the gutter and the ground, and whose resistance may be low to pathogenic organisms which are 'new' to them.

I have no animosity for the pigeon. Indeed I have admiration for some of

its colours; but one must admit that the health nuisance is great—and growing. National monuments are becoming a national disgrace. Nor should the Nelsonian eye be turned away from this hazard, for recent careful counts of wild pigeons show an almost unparalleled explosion of population.

All must admit some streets have been fouled, some drain-pipes have been choked, nesting has taken place in rafters, quickly adding to the other verminous infestations. Contamination and damage is common in older buildings and fittings.

The pigeon likes sitting on the rungs of ladders. Gangways and metal steps are common in Docks areas. Many a man has had an accident when slipping on the slimy droppings. In warehouses on the Docks grain may be spilled thus attracting and increasing the pigeon population, and thus the nuisance worsens.

The worst offence against health hygiene and amenity is, of course, the presence of pigeon faecal matter in and about cafes, restaurants and



Refreshments in St. James's Park

kiosks. It is common for misguided folk to feed the pigeons in these places—the very ones in which they can be the greatest nuisance and offence against food hygiene.

We do well to recognize the strong forces against any form of control. On being taken for euthanasia, birds which were humanely trapped by us were released by bird-lovers. I must warn my colleagues who have not commenced control measures against these intruders of amenities that they may expect a spate of offensive letters calling for their early retirement—or, preferably, to be shot at once. Some anonymous correspondents have addressed me as “My dear M.O.H.”

and others have called me by other names.

What a pity that the mothering instinct of so many women who feed pigeons cannot be satisfied in caring for deprived children! Or perhaps sublimated to Oxfam?

The task of health education is truly formidable; but it must be attempted: And attempted not only against the old pollutants long since known to us all, but also against the newer forms of pollution—so that preventive action may be taken early. In this way, prevention will be far cheaper, pleasanter—and much more certain than cure.



Electric floorwarming is successfully being used for heating the choir and Lady Chapel of Salisbury Cathedral. The heating cables are beneath Purbeck marble slabs recently laid to replace worn Victorian tiles. Despite the size of the building floorwarming has proved more economical and more efficient than the Victorian coal stoves and the heating is to be extended to other parts of the Cathedral. Photo shows tests being carried out in the Lady Chapel to find the vertical temperature gradients and the floor surface temperature necessary to give the design air conditions. The lady in the photo is Miss Miriam Griffiths, head of heating research at the Electrical Research Association

FUEL POLICY PROPOSALS

Report from PEP

A Fuel Policy for Britain. A PEP Report. pp 236. 50s. net. Political and Economic Planning, London.*

In our last issue we reviewed the short PEP broadsheet "Questions on Fuel Policy", which has now been followed by a much more detailed—indeed a most comprehensive report on the subject. It offers comment on a wide range of issues in British fuel policy. It also includes a much fuller Statistical Index, including "Energy Balances" of the style used on the Continent.

The report has two main parts. After introductory chapters it presents industry chapters on electricity, gas, oil and coal. These chapters are intended as critical summaries of the views of the industries themselves on a number of problems, affecting them individually and jointly, that the industries themselves think important. Then the final chapters put forward the conclusions of the PEP working group. People in the fuel industries had a chance to see these in draft, and to argue; but, it is said, their views were not necessarily accepted.

The report is not unmixedly critical of current fuel policy in Britain. It says: "... the Government's fuel policy, as set out in its White Paper of October 1965, is no more protectionist than those of most Western economies with large indigenous fuel industries, and more liberal than many".

Nor does it necessarily believe, for the short term, in reducing support for the British coal industry below the current level decided on by the Government, and hence running down coal output faster than is envisaged in the National Plan and the White Paper on Fuel Policy. But it does feel "that an alternative fuel policy—putting more

emphasis on bringing down the general price of energy in this country—would, from now on, suit Britain better".

Inevitably, much of the report is concerned with the position of the coal industry. It proposes that short-term help for the industry should be entirely by financial assistance to the National Coal Board. This is considered to be a wiser way than the mixture of tariff protection, import controls and financial aid now used, to support the British coal industry at a higher level of production than is strictly economic.

Such financial aid—further remission of NCB interest, and if necessary operating subsidies—could be made degressive, i.e., reducing year by year to nil in the early seventies. In any case, it could be subject to annual review.

A change to direct financial aid would enable the country to dispense with the heavy excise duty on oil burned as fuel, the bans on imports of American coal and Russian oil, and anomalies arising from current protective policies. It would make the cost of coal protection clear to the taxpayer, and it would adjust the ruling prices of fuel in Britain to levels set by competition, not levels aligned on the prices of coal.

Britain can well afford short-term support for its coal industry until the early seventies, to give the Coal Board a chance to make itself fully competitive. By then, more will be known about the cost and volume of the North Sea gas available, and about nuclear electricity generating costs by the "post-Dungeness" techniques. Beyond that date, it is up to public and Parliament to decide how much more coal it wants produced than can compete with other fuels, domestic and imported. The report is doubtful whether keeping uncompetitive coal production in being is the most economical form of insurance against possible insecurity of oil supplies at cheap prices.

* Orders for the report should be addressed to PEP Despatch Dept., 98 Kingston Road, London, S.W.19.

SMOKE CONTROL AREAS

Progress Report

POSITION TO 1 JANUARY, 1966—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,767	63
<i>Acres</i>	411,230	25,532
<i>Premises</i>	2,301,215	148,280
Smoke Control Orders		
Confirmed	164	12
Submitted	114	7
Grand Totals	2,089	83

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Winter, 1965) which gave the position up to 1 October, 1965. They now show changes and additions to 1 January, 1966.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

NEW SMOKE CONTROL AREAS IN OPERATION

Northern

Tees-side

*Hartlepool B. No. 1, West Hartlepool C.B. No. 2.

Yorkshire

West Riding (North)

Aireborough U.D. No. 17, Baildon U.D. No. 3, Bingley U.D. No. 12, Brighouse B. No. 9, Halifax C.B. No. 12 (their No. 11), Horsforth U.D. No. 22

(their No. 19b), Leeds C.B. Nos. 49, 50, Shipley U.D. No. 6, *Spenborough B. No. 6.

West Riding (South)

Sheffield C.B. Nos. 5, 16.

North Western

South Lancashire and North-East Cheshire
Dukinfield B. No. 6, Failsworth U.D. No. 4, Whitefield U.D. No. 8 (their No. 5b).

Central Lancashire

Blackburn C.B. No. 5, Church U.D. No. 4, *Preston C.B. Nos. 10—12.

Merseyside

Bebington B. No. 9, Derby C.B. No. 6, Liverpool C.B. No. 17.

Midlands

Derby, Nottingham and Chesterfield
Dronfield U.D. No. 1.

North Midlands

Leicester C.B. Nos. 14—15.

West Midlands

Birmingham C.B. Nos. 102, 112 (their No. 118), 113 (their No. 119) 114 (their No. 120), Brierley Hill U.D. Nos. 20—25, Solihull C.B. No. 7, *Walsall C.B. No. 26, *Wednesfield U.D. No. 6.

The names of local authorities given in the following list are those under which the Smoke Control orders were originally confirmed, and before the changes in Greater London boroughs took place.

Greater London

Barnes B. No. 6, Beckenham B. No. 3, Brentford and Chiswick B. No. 6, Dagenham B. No. 7, Deptford M.B. No. 7, (their No. 6), Edmonton B. No. 7, Enfield B. No. 5, Feltham U.D. No. 5, Finchley B. No. 11, Hammersmith M.B. No. 7, Hampstead M.B. No. 7, Harrow B. No. 9, Hayes and Harlington U.D. No. 25, Hornsey B. No. 7, Lewisham M.B. No. 20, Mitcham B. No. 3, Southgate B. No. 5, Southwark M.B. No. 4, Sutton and Cheam B. No. 3, Wandsworth M.B. No. 7, Wembley B. Nos. 10—11, Willesden B. No. 7, Wood Green B. Nos. 7—8, Woolwich M.B. No. 20.

Local Authorities outside the Black Areas

Gillingham B. No. 3, City of Rochester No. 2, Scunthorpe B. No. 5, Slough B. No. 8, Watford B. No. 4, Yiewsley and West Drayton U.D. No. 8.

NEW ORDERS CONFIRMED BUT NOT YET IN OPERATION
Northern*Tyneside and Wearside*

Gateshead C.B. No. 8.

Yorkshire*West Riding (North)*

Batley B. No. 4, Heckmondwike U.D. No. 5, Horbury U.D. No. 3, Pudsey B. Farsley (North) No. 4.

West Riding (South)

Doncaster C.B. No. 8 (Wheatley).

North Western*South Lancashire and North-East Cheshire*

Audenshaw U.D. No. 4, Cheadle and Gatley U.D. No. 7, Denton U.D. No. 11, Stretford B. No. 8.

Central Lancashire

Blackburn C.B. No. 6, Burnley C.B. No. 7, Preston C.B. No. 13.

Merseyside

Bootle C.B. (Netherton) No. 7, Bebington B. (Area No. 19), St. Helens C.B. No. 1.

Midlands*Derby, Nottingham and Chesterfield*

Chesterfield R.D. No. 6.

West Midlands

Aldridge U.D. (New Estates Nos. 17—21) (Streetly No. 22) (Coppo Hall Estate No. 23), Birmingham C.B. Nos. 79, 80, 121, 122, Dudley C.B. (Central), *Smethwick C.B. No. 7, Solihull C.B. Nos. 8—10,

Sutton Coldfield B. No. 5, West Bromwich C.B. No. 15, Wolverhampton C.B. (West Central Area).

Greater London

Brent L.B. No. 1 (Tokyngton), Greenwich L.B. (Plumstead) (Brook), Harrow L.B. No. 10, Islington L.B. (Area 23), Kingston-upon-Thames L.B. Nos. 6—8, Merton L.B. No. 1, Redbridge L.B. No. 10, Sutton L.B. No. 14, Havering L.B. No. 1.

Local Authorities outside the Black Areas

Blaby R.D. (Glen Parva) No. 3, Brentwood U.D. No. 5, Exeter C.B. (Pyne's Hill), (Salmon Pool Lane), (Redmills and Exwick), Mold (Wales) U.D. No. 1, Skelmersdale U.D. No. 1, Slough B. No. 9, Southampton C.B. No. 3 (Westgate) C.B. 4, Winsford U.D. No. 8, Skipton U.D. No. 3.

NEW ORDERS SUBMITTED BUT NOT YET CONFIRMED
Northern*Teeside*

Darlington R.D. (Newton Aycliffe No. 2), Hartlepool B. No. 2, Mirfield U.D. No. 7.

Yorkshire*West Riding (North)*

Aireborough U.D. No. 19, Baildon U.D. Nos. 4—6, Elland U.D. No. 2, Elland U.D. No. 2 (Stainland), Horsforth U.D. Nos. 20—21, Morley B. No. 33, Rothwell (Yorks.) U.D. No. 8, Shipley U.D. Nos. 7—8.

North Western*South Lancashire and North-East Cheshire*

Bolton C.B. (Derby Ward Nos. 1—2), (Halliwell Ward), (West Ward Nos. 1—3), Failsworth U.D. No. 5, Manchester C.B. (Withington), Oldham C.B. No. 8, Rochdale C.B. (Buersill and Kingsway), Whitefield U.D. 5c.

Central Lancashire

Burnley B. No. 8, Preston C.B. No. 14.

Merseyside

Birkenhead C.B. (Area No. 4 Claughton).

Midlands*Derby, Nottingham and Chesterfield*

Beeston and Stapleford U.D. No. 7, *Chesterfield R.D. No. 7 (Killamarsh), Sutton in Ashfield U.D. Nos. 1—3.

West Midlands

Coventry B. No. 8, Sedgley U.D. No. 9, Sutton Coldfield B. No. 6.

Greater London

Barnet L.B. No. 11, Bexley L.B. No. 6, Bromley L.B. No. 1, Camden L.B. (St. Pancras No. 7), (Hampstead No. 8), Croydon L.B. No. 8, Ealing L.B. Nos. 23—24, L.B. of Enfield No. 11, Hackney L.B. No. 10, Havering L.B. No. 2, Hillingdon L.B. No. 1, L.B. of Hounslow (Brentford and Chiswick No. 7), (Feltham No. 6), (Heston and Isleworth No. 10), Kensington and Chelsea L.B. (Earls Court and Redcliffe and Brompton), Lambeth L.B. No. 16, Merton L.B. No. 2, Newham L.B. No. 3, L.B. of Richmond on Thames (Barnes No. 7), Waltham Forest L.B. No. 9.

Local Authorities outside the Black Areas

Basildon U.D. No. 4, Chatham B. No. 3a, Crawley U.D. (Langley Green Neighbourhood), Hemel Hempstead B. (Warners End), High Wycombe B. No. 13, King's Lynn B. (Fairstead), Luton C.B. No. 4, Oxford C.B. No. 5, Reading C.B. No. 10, Seaton Valley U.D. (Cramling-

ton), Staines U.D. No. 7, Thurrock U.D. No. 4, Wrexham (Wales) B. No. 2.

SCOTLAND**NEW ORDERS IN OPERATION**

*Edinburgh (Corstophine No. 4), Grangemouth (Bowhouse No. 2), Milngavie (Mains Estate), Renfrew (Burgh No. 1), West Lothian (Livingstone New Town).

NEW ORDERS CONFIRMED BUT NOT YET IN OPERATION

Clydebank No. 5 (Boquhanran), Paisley (Thornly Park/Lochfield), Renfrew Burgh No. 2, Stirling County (Larbert No. 1).

NEW ORDERS SUBMITTED BUT NOT YET CONFIRMED

East Kilbride (West Mains), Fife County (Glenrothes No. 1), Glasgow (Camphill, Langside, Govanhill).

Summary of Smoke Control Progress

As at 31st December, 1965

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern ..	17,470	13.9	81,135	14.7
East and West Ridings ..	91,105	24.2	324,990	27.8
North Midlands ..	22,150	8.3	79,850	15.6
Greater London ..	149,670	45.8	1,350,560	51.2
North Western ..	95,170	23.7	432,680	25.4
Midlands ..	46,530	18.7	215,860	20.5
South Western ..	5,050	19.2	18,105	12.2
Wales and Monmouthshire	270	0.1	1,690	0.4
Totals (black areas)	427,415	20.3	2,504,870	30.5
Outside Black Areas (all parts) ..	74,604	—	263,667	—
Grand Totals ..	507,019	—	2,768,537	—

* The percentage shown in columns (3) and (5) above are percentages of the *total* acreage and of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of a black area authority's district to be covered by smoke control orders (e.g. there may be some areas of open country).

VEHICLE EXHAUSTS AND HEALTH

R.S.H. Symposium

The Royal Society of Health held a meeting in London on 16 February at which three papers on "Vehicle Exhausts in Relation to Health" were read. The authors were Dr. L. E. Reed, of the Warren Spring Laboratory, Mr. H. D. Fawell, Ministry of Transport, and Dr. P. J. Lawther, of the Air Pollution Research Unit, Medical Research Council. We give brief reports on the three papers.

DR. REED

The paper first gave an account of the pollutants emitted from road vehicle engines, and followed this by discussion of smoke from diesel engines. On getting rid of the smoke when once it had been formed Dr. Reed said: "The possibility of finding a cheap, practicable method of removing smoke appeared to be remote; as most of the smoke was attributed to the malfunctioning of the engine caused by the lack of proper maintenance, a more profitable approach appeared to lie in devising means for detecting offending vehicles."

The only test that appeared to offer any chance of success, he continued, was the free acceleration test as used in Belgium. (This was described by Mr. Coucke in his paper to the NSCA conference at Eastbourne last October). Experiments on this test have been carried out and are described, with a diagram showing results, but it was found that "in most cases, the smoke obtained during the free acceleration test was less than that produced at full load, and only in a few cases, where lower levels of smoke were obtained, was the reverse found."

"The free acceleration test was therefore suitable for use on the road as a means of picking out some of

the worst offenders. However, a high percentage of these would still be passed as satisfactory."

"The use of a smokemeter as a roadside check," continued Dr. Reed, "is therefore of doubtful value and a trained observer who can actually observe the vehicles emitting smoke in operation and then takes action appears to be a more positive way of reducing the smoke problem."

Control of Smoke from New Engines

Dr. Reed referred to the British Standards Committee set up to formulate a standard for diesel engines for road vehicles, one of the main provisions being a limit on the density of smoke emitted. As zero emission of smoke is technically unobtainable, limits were derived based on the levels of smoke the public were prepared to accept. These limits, found by practical observation tests, were now being considered by the British Standards Institute as the basis of a new standard and there was every hope that engines would soon be available to meet it.

Petrol Engines

The paper continues by discussing petrol engines and the pollution they cause, with reference to the work and action done in California. It is pointed out that "poor maintenance had often been blamed for the diesel engine problem, but the same can also be said of the petrol engine although its effects are not so obvious. The high concentrations of carbon monoxide that are produced under idling conditions can often be reduced by adjusting the carburettor and the widespread of this technique could well have beneficial results."

Dealing with concentration in city streets, Dr. Reed pointed out that:

"If the consumption of motor fuel in London in 1964 was 1.23 million tons and presumably if the number of cars doubles by 1974 then the fuel used will rise in proportion to 2.64 million tons. It is estimated that this latter figure will give rise to an emission of about $1\frac{1}{2}$ million tons of carbon monoxide. It is interesting to compare these figures with the consumption of domestic coal in London. This has decreased from 3.6 million tons in 1954 to 1.1 million tons in 1964, and presumably by 1974 there will be a further reduction. The domestic fire has created most pollution by smoke and much of that by sulphur dioxide in London and it has taken many years of patient work to overcome the smoke problem. Having learnt one lesson the hard way from the domestic fire, it would be the height of folly if we allowed ourselves to drift into a position where, in ten years' time, the motor vehicles presented a problem of similar magnitude.

Vertical Exhausts

In view of many criticisms that have been made on this subject, Dr. Reed's opinion is of interest. He says:

"It has long been contended that vertical exhaust pipes would be an advantage from the dispersion aspect. The point of emission, at present, is about one foot from the ground, and, as dilution must occur partly by vertical mixing, any increase in the height of emission would tend to reduce the concentration found near the ground and certainly that to which the pedestrian is subjected.

"The counter-argument is that, with a vertical exhaust pipe, people on the top of buses would be subjected to dangerous concentrations. There is a remote possibility of this, but there would be fewer people at risk than with the present systems . . . there are, of course, engineering disadvantages mainly caused by condensation in the longer exhaust pipes, but if no other means can be found for reducing pollution then vertical exhaust pipes should be considered."

H. D. FAWELL

After an introductory section headed "The Motor Vehicle Age", Mr. Fawell's paper dealt with basic engine design features, crankcase emissions, the causes of smoke from diesel engines, remedial measures to reduce smoke, legislation and enforcement for diesel smoke, the causes of carbon monoxide and hydrocarbon emissions in petrol engines, remedial measures, legislation and enforcement for carbon monoxide and hydrocarbons, and finally, international developments.

Discussing crankcase emissions, the paper points out that the amount of carbon monoxide emitted *via* the crankcase is very small compared with the amount of hydrocarbons and because of the essential part which hydrocarbons play in causing the Los Angeles "smog", much attention has been paid in the U.S. to eliminating crankcase emissions. The method of doing this has been by drawing the blow-by gases out of the crankcase and into the air intake side of the engine, either into the intake manifold or the air cleaner or both.

Mr. Fawell continued: "Crankcase fumes can be unpleasant and they are sometimes excessive, but their contribution to the carbon monoxide level in U.K. cities is probably negligible and hydrocarbons are not so significant here as they are in California. It is nevertheless worth considering whether positive crankcase ventilation should be adopted for all petrol-engined vehicles."

On remedial measures to reduce smoke from diesels, Mr. Fawell said:

"Some goods vehicles are under-powered and a number are all too often overloaded. These two factors are closely related and the Ministry is now engaged on working out a scheme by which the maximum permissible gross weight of a vehicle can be determined solely in relation to its design and construction regardless of whether that weight is less than the legal maximum for the class of vehicle. The agreed weight will have to be displayed on a plate on the

vehicle and it will be an offence to load the vehicle beyond that weight. In arriving at an agreed weight it would not be unreasonable to take into account the power to weight ratio (the engine horsepower per ton of gross vehicle weight) as a means of ensuring that the vehicle had sufficient power for an adequate performance and so avoid both the temptation to overfuel the engine and the likelihood of excessive smoke”.

The paper went on to describe the legislation available for the control of diesel smoke—police action and the roadside checks by the Ministry’s examiners—and continued:

“As already announced, the Ministry is preparing a scheme to extend annual testing of vehicles to cover heavy goods vehicles. The intention is that these tests shall include a check for conditions causing or likely to cause the emission of excessive smoke and this should be a great step forward.

“At a later date it is hoped to introduce a system of Ministry type approval for new vehicles which will include certain performance tests and take account of such things as an agreed power to weight ratio. Despite likely increases in the number of diesel vehicles on the road it is hoped that a combination of the above measures will succeed in substantially reducing the incidence of diesel smoke emission.”

Petrol Engine Exhausts

The paper discussed remedial measures to reduce the emission of carbon monoxide and hydrocarbons from petrol-engined vehicles, under the headings of short and long term measures. Among the latter was changes in engine design to improve combustion, and it was concluded that a considerable amount of engine design and development work will have to be done before vehicles can be produced which incorporate some or all of the long term measures required.

On legislation to control CO and hydrocarbon emissions, the author said:

“To be effective the method of control must be based on accepted standards and reliable means of enforcing these standards. The problem lies in determining just what degree of control is really necessary and the best way of achieving it. The pioneering efforts of the Californian authorities have been forced on them by an almost unique combination of geographical and climatic features and a very high vehicle population. We could simply adopt the Californian standards but this may be both undesirable and unnecessary because in consequence of their particular atmospheric conditions, the prime aim of those standards is to reduce the emission of hydrocarbons and oxides of nitrogen rather than carbon monoxide and it is by no means certain that the operating cycle on which the standards are based is the right one for this country or indeed other parts of Europe. For instance, the urban traffic pattern in the U.K. is such that a vehicle is accelerating, decelerating or stationary with the engine idling for a much greater proportion of the total journey time than in California. Furthermore it is by no means clear that remedial measures which may be applied more or less successfully to the much larger American petrol engine are necessarily appropriate or effective in the case of the much smaller British engines having different design characteristics.

“Unfortunately, reduced air pollution is not a selling point so far as motor vehicles are concerned and it may be necessary to introduce fresh regulations in order to secure any marked improvement. The Ministry of Transport is now actively considering what needs to be done. It may, for example, be desirable to give manufacturers some indication of the maximum acceptable concentrations of pollutants, and especially carbon monoxide, in exhaust gases . . . The motor industry is already carrying out extensive research into ways and means of reducing air pollution from petrol-engine vehicles, and it is hoped

that in the near future it will be possible to arrive at agreed standards for the maximum acceptable amount of pollutants emitted.

DR. P. J. LAWATHER

The third paper in the symposium begins with a memorable paragraph phrased in what may be described as the best Lawtherian mode:

"Much has been written about the real, suspected, and imagined effects of vehicle exhausts on man and on experimental animals. The largest single review on the subject is the Report of the Surgeon General to the U.S. Congress, *Motor Vehicles, Air Pollution and Health*, 1962. The work has 459 pages and refers to 716 publications. This essay must be no longer than 4,000 words, but there is merit in the enforced brevity; the U.S. Surgeon General's Report, admirable though it is, is so comprehensive that, inevitably, space is given to much work which is of dubious value or of little relevance to the problem which besets us; by its bulk it can confuse those who are not working actively in the field".

The only trouble with the enforced brevity is that it becomes difficult to summarize it, or to select extracts that can fairly be torn from their context, so tautly built up it is.

Dr. Lawther first defines the problem and then describes the methods of investigation, and then follows with a survey of the suspected pollutants. These are listed as hydrocarbons, smoke, oxides of nitrogen, Los Angeles type photochemical smog, aldehydes, sulphur dioxide and sulphuric acid, lead and carbon monoxide. Finally: "Many other pollutants would claim attention in a larger review of the problem . . . vehicles may emit literally hundreds of different complex compounds and naturally a vigilant attitude must be preserved".

Perhaps the most important, and certainly the most topical because of the considerable interest being currently aroused, is the section of the paper on carbon monoxide, and this

it seems essential to quote *in extenso*, as follows.

Carbon Monoxide

"This interesting gas is emitted by petrol engines, and by diesel engines only when they emit much black smoke. It is colourless and odourless and has a great affinity for the haemoglobin of the blood. The iron containing pigment is present in red blood cells and enters into an advantageous loose chemical combination with oxygen brought to the blood by the lungs (its dissociation curve is S-shaped which greatly favours oxygen transport to the tissues). Carbon monoxide has an affinity for haemoglobin roughly 210 times that of oxygen. Small amounts in the air will therefore be seized by haemoglobin and oxygen transport will be hampered. (The danger is made more severe by the fact that carbon monoxide also shifts the oxygen dissociation curve upwards and to the left thus reducing the pressure gradient needed for adequate diffusion of oxygen from blood to tissue.)

"The percentage CO-haemoglobin in the blood will depend on several factors: the concentration of carbon monoxide inhaled is of obvious importance. With any given concentration (short of that producing death) the body will eventually achieve equilibrium, the rate at which equilibrium is achieved depending on the rate at which the gas is presented to the body: it will therefore depend on the ventilation of the lungs which in turn will usually depend on the degree of activity of the person. The blood concentration at times short of equilibrium will of course also depend on the period of exposure. Forbes, Sargent and Roughton (1945) have published curves and formulae showing the blood saturation under these differing conditions but it should suffice here to say that a person doing moderate exercise in air containing 100 p.p.m. (the industrial maximum allowable concentration) will reach 8 per cent saturation in 1 hour and equilibrium at 16 per cent in $2\frac{1}{2}$ hours.

Walking about in 350 p.p.m. would produce 16 per cent saturation in in $\frac{1}{2}$ hour and 25 per cent saturation in an hour. Extensive surveys have been done of ambient air concentrations of CO and of concentrations in the blood of people exposed to traffic. When measuring the carbon monoxide in Fleet Street, at the Bank and off Oxford Circus, it was found that concentrations of 100 p.p.m. occurred not uncommonly and on one occasion 360 p.p.m. was found on the pavement at Oxford Circus. By far the most important work is that of Moureu and his colleagues who have made extensive measurements of CO in air and in blood in Paris. He found, and is still finding, "that motor vehicle pollution is the most frequent cause of high blood CO concentrations" and that "the blood of drivers of vehicles contains on an average more carbon monoxide than that of workers who, because of their occupation, are liable to the hazard."

"The literature dealing with the clinical effects of carbon monoxide is peculiar: much attention was at one time given to the determination of "safe" concentrations at which the subject developed no symptoms and the description of the more severe symptoms attending high blood levels. Thereafter little attention was paid to the possibility that concentrations too small to produce symptoms such as headache, nausea and giddiness might yet impair performance of fine tasks and such other physiological processes such as visual perception. There has in the years since the war been a revival of interest in this important field; the possibility that chronic monoxide poisoning following the use of producer gas driven cars in Scandinavia started an active school of investigators. The question of whether or not there is such a disease as chronic carbon monoxide poisoning (as distinct from the chronic sequelae of acute poisoning) is still not resolved but there is mounting evidence that concentrations in the blood amounting to between 5 and 10 per cent saturation

can disturb psychomotor abilities and perception (Shulte), can impair visual discrimination for brightness (MacFarland *et al.*) and produce impairment in control precision and multiple limb co-ordination (Trouton & Eysenck). The significance of these findings is obvious with respect to the safety of drivers who may often acquire blood CO concentrations well above this range. Even more important is the possibility that CO, petrol vapours, alcohol and sedative drugs might act synergistically to produce relatively gross dysfunction. Investigations of these possibilities and of the prevalence of high blood CO levels is proceeding and is facilitated by the development of a new simple method for determining the CO content of finger-prick samples of blood (Commins and Lawther)."

Clean Air for You

This was the theme of a full meeting of women's organizations, sponsored by the London Regional Committee of the Women's Advisory Council on Solid Fuel, held in the Kensington Town Hall on Monday, 9 November, 1965.

Mrs. M. F. Willison, of the Solid Smokeless Fuels Federation, was in the chair. The meeting was opened by the Mayor of the Royal Borough of Kensington and Chelsea, Alderman Arthur J. Sims, J.P., and the principal speaker was Lord Robens, Chairman of the National Coal Board. Others on the platform who spoke included Mrs. J. C. Cockcroft, Chairman of the WACSF, Sir Alan Wilson, F.R.S., President of the National Society for Clean Air, and Mr. Frank Wilkinson, C.B.E., President of the Coal Utilization Council.

There was also a special exhibition to emphasize the role of clean air and how solid fuel can play its part.

METHANE STORY

The Film of a Great Enterprise

The Gas Council film "Saharan Venture" has been reviewed in this journal, and now we have the longer, more technical version of the record of the great and successful venture of bringing natural gas from Africa and distributing it by pipeline from the south to the north of England. "Methane Story" is a first-class visual account of this development, designed primarily for technicians and engineers, contractors and manufacturers of equipment, and professional and technical associations and colleges.

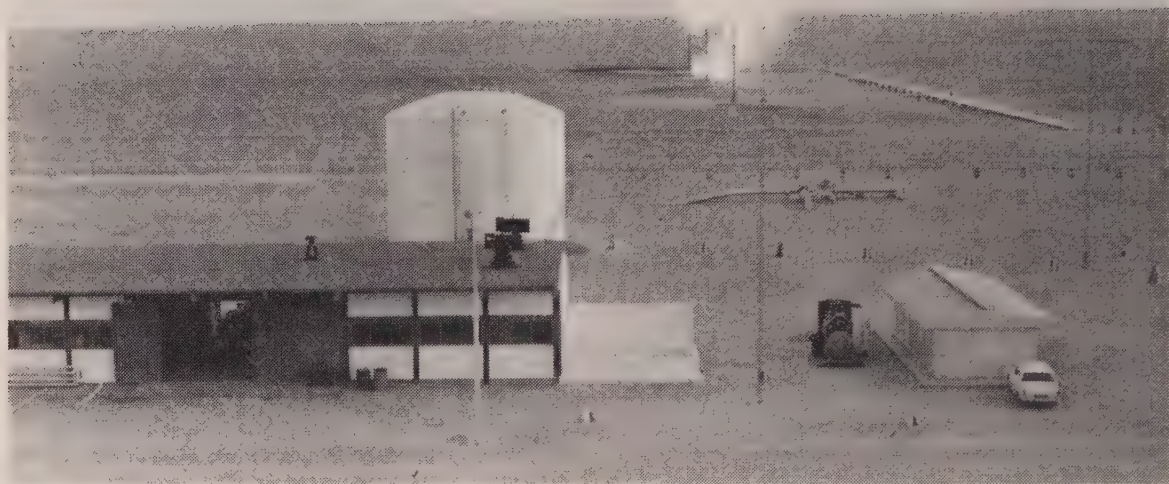
It is in Eastman colour, runs for 45 minutes, and is a straight documentary showing the construction of the terminals, the laying of the pipelines and the other organization of this complex and unique enterprise.

Despite the fact that the film had to be shot at many different places under very different conditions, and at different times, there is a unity of approach and colour that is most satisfying, giving to the production a character of its own, creating a dramatic impact, despite or because there was no attempt at drama.

Particularly interesting to one viewer at least is the account of the laying of the pipelines across England. Obstructions in the path of the pipeline were many and varied—460 roads, 56 railways, 60 rivers, 10 canals; running sand, water bound gravel, soft subsoil, chalk and limestone rock, a 40 foot deep peat bog, mountains, ravines, swamp—and the worst winter for a hundred years.



The Methane Pipeline being placed in the trench on the Pennine Spur



A view of part of the natural gas field at Hassi R'Mel in the Sahara Desert from where the gas is piped to Arzew, near Oran, and then delivered by special ships to Canvey Island, Essex

Negotiations with landlords were legion, one stretch of 40 miles requiring nearly 150 separate contracts. Despite these difficulties, the pipeline was laid in less than 12 months, with every foot of topsoil restored to its original state.

The film was made internally by the Gas Council, was produced by Stanley

Irving, Films Officer, and written and directed by Harry Woof. It is available from the Gas Council, in 16mm., on free loan. We confidently recommend it for a showing at meetings of the Society's Divisions or by other organizations. For schools, women's meetings, etc., "Methane Story" would be preferable.

Natural Gas in Canvey Island

During the past few years the North Thames Gas Board, in common with others, has enjoyed a very considerable increase in the sale of gas. Modern gas appliances such as central heating units and room heaters, cookers and refrigerators, have found favour with the public with the result that the demand for gas has risen very steeply. Each year now the gas consumption on average increases by approximately 8 per cent, and on a very cold day in mid winter, as much as 14 per cent more than on a similar day the previous year. In fact the peak load will be doubled in the next 5-6 years.

The rate of increase in Canvey, a fast developing area, is almost twice these general average figures.

These increases in demand have to be met in the production of gas and in its distribution to the customer, and one important means of increasing the carrying capacity on the distribution system is to increase the heat content of the gas carried. As an illustration, one cubic foot of the present gas distributed contains 500 heat units. Natural gas being imported from Africa at the moment into Canvey contains about 1,000 heat units per cubic foot. If, therefore,

natural gas were piped along the distribution system it would result in the same system carrying more heat than it does at present and this would be a great help to us in meeting the rapidly increasing requirements of our customers.

It is not, however, quite as easy as that. Natural gas is not suitable for the appliances which have been sold over the past years on the Board's area unless they are converted for the purpose. Generally speaking the conversion is not difficult, and indeed in practically the whole of the United States and in large and increasing parts of Europe, the distribution of natural gas direct to customers and the conversion of appliances in customers premises has been, or is being undertaken.

The North Thames Gas Board propose to do exactly this on Canvey Island, to distribute natural gas (which is non-toxic) throughout the Island and to convert customer's appliances to burn this natural gas. The conversion will take place in June/July, 1966, and there will, of course, be no cost to the individual customer for the conversion work.

The proposed programme for conversion on this Island will take the following shape. The press announcement will be followed by a personal letter to every customer which will explain a little more what we have in mind. This letter will be followed up by a personal call from one of our representatives who will discuss the conversion procedure in detail and give the fullest information as to what is intended and what its effect will be. Two or three days before the date of conversion the customer will receive a post card reminding them of the date. The general pattern will be that on the conversion date the fitters will call, convert the appliances, test on the new gas and leave in working order.

Canvey is the first locality of any size to be converted in this country to natural gas. It is proposed, for this conversion alone, to reduce the price of gas by 1d. per therm on all current tariffs.

NEW CALOR GAS FILM

Wherever you live and whoever you are, you can have a fast, modern and reliable gas at the turn of a tap. This is the message to Britain's housewives of the new excellent colour film entitled "The Blue Flame" which had its premiere in London on 1 February. Produced for the Calor Gas (Distributing) Co. Ltd., the film runs for 17 minutes and shows most effectively the advantages of a "portable" gas to homes which have no mains gas. The film illustrates the point dramatically by turning its attention from the homes of Hebridean crofters that run on Calor Gas, to one of the stately homes of England where the same fuel is evidently used. The focal point is a modern house near Southampton, where a young housewife employs Calor Gas to run all the very latest domestic appliances from a simple cylinder installation. It is emphasized that the housewife can always rely on Calor gas; it is delivered to her and there are no problems of winter load-shedding or reduced pressure. She need never run out of gas since the cylinders can be replaced regularly and promptly.

A sequence of the film illustrates the service which the customer of Calor gas can expect and the wide range of appliances which are available for heating and cooking.

The variety of surroundings in which this gas can be used are shown by shots of picnickers in Ireland, modern caravan homes with Calor gas central heating, boats on the Norfolk Broads and an evening barbecue held beside an open air swimming pool. Here Calor gas is shown to heat the pool, warm the air, power flood-lighting and cook the food.

"The Blue Flame" was made by Cygnet Films and directed and produced by Rae Evans. It can be obtained from: Calor Gas (Distributing) Co. Ltd., 33 Cavendish Square, London, W.1.

A New Smokeless Fuel

“Multiheat”—for Boilers and Roomheaters

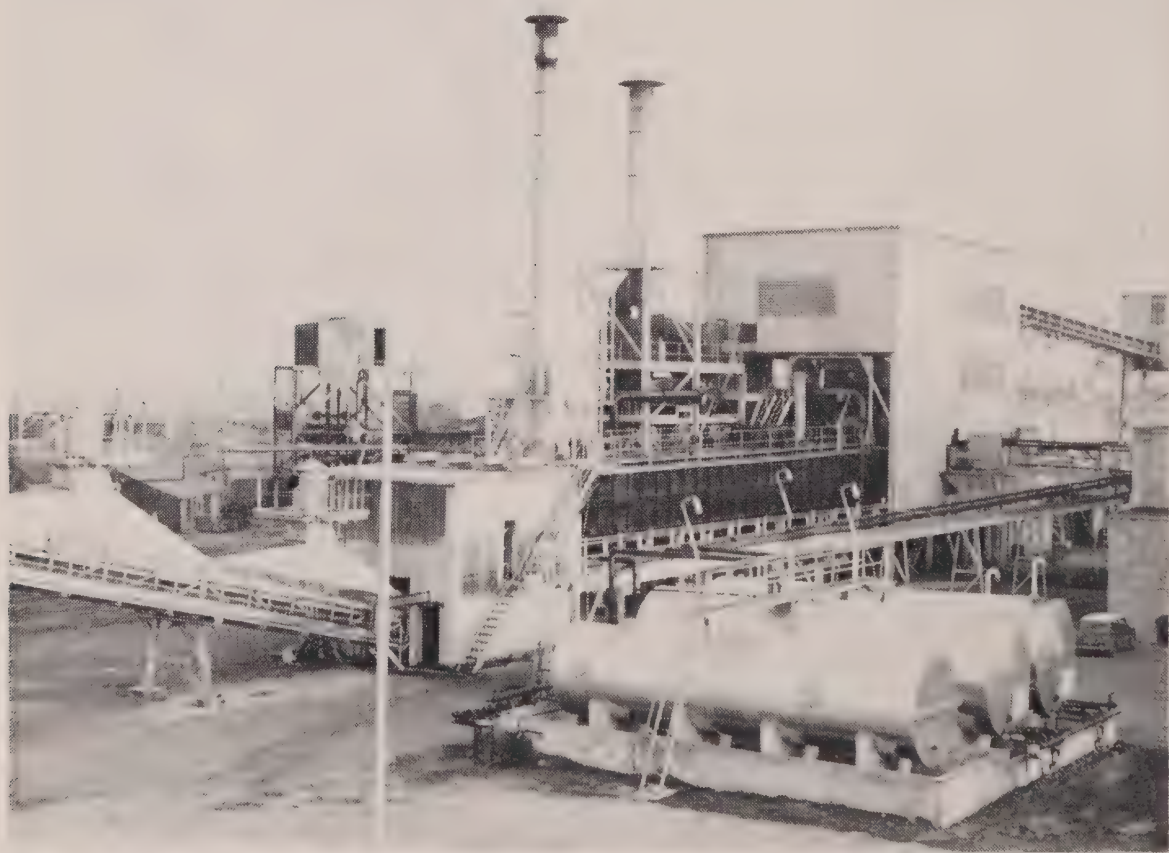
Multiheat, a new manufactured solid smokeless fuel, is now being produced in South Wales by the National Coal Board.

Based on fine anthracite, Multiheat is designed for use in closed appliances—independent and central heating boilers and roomheaters; but it can also be used on modern open fires. A £600,000 plant, erected on part of an 8½ acre site, formerly occupied by the Crown Fuel Works, will produce initially an output of about 110,000 tons a year. Extensions to the existing plant as a second-stage development, are envisaged as demand develops.

Multiheat is made from about 90 per cent fine anthracite and 10 per cent South Wales coking coal, with the addition of a little creosote oil and pitch as a binding agent.

The mixture of coals and binding agents are formed into ovoids in rotary presses. The ovoids are then subjected to mild heat treatment in a hot fluidized sand bed. The process yields a hard, dense, smokeless fuel of high quality, manufactured to a precise specification, with consistent burning characteristics.

The combination of a dense fuel and ovoid shape makes the best use of the



A general view of the Multiheat plant. In the foreground are the storage tanks for various liquids used in the process as well as the coal tar fuel oil used to preheat the sand. Behind the tanks is the structure of the kiln through which the ovoids move in the hot sand bed

**INCHAR SAND BED PROCESS FOR MILD HEAT TREATMENT OF PITCH BOUND
LOW VOLATILE COAL BRIQUETTES**
DIAGRAMMATIC FLOW SHEET

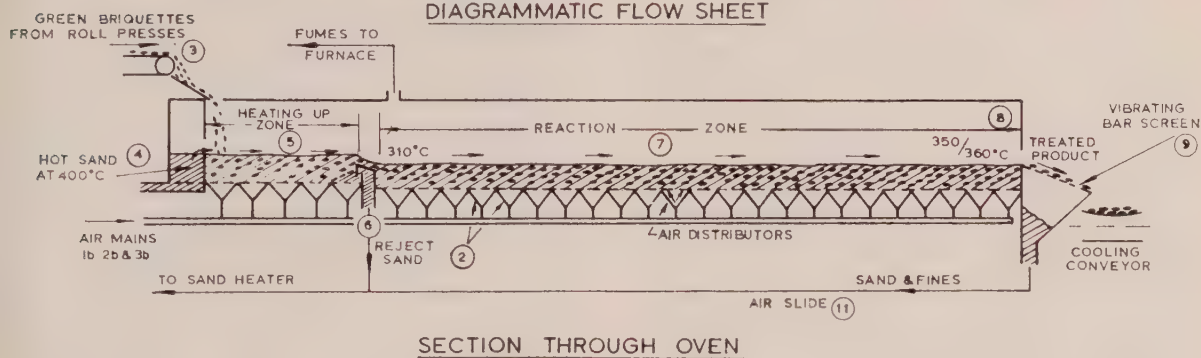


Diagram showing the process used in the manufacture of Multiheat

capacity of an appliance, ensuring long periods of continuous burning between refuelling. It also makes the best use of space in the coal store. In use, Multiheat is easily lighted by any of the normal methods.

The first stage of development of the plant will employ about 100 men. The plant uses the latest techniques, including closed-circuit television, to achieve a very high degree of mechanization.

It will operate continuously on a three-shift basis in order to make maximum use of the capital employed.

Initially the plant will need 110,000

tons a year of fine anthracite and 12,000 tons of coking coal—all produced within the National Coal Board's South Western Division. Cardiff, as a location for the works, is favourably placed for despatch of the product to London and the South and West of England, the areas which are expected to provide the major markets for Multiheat.

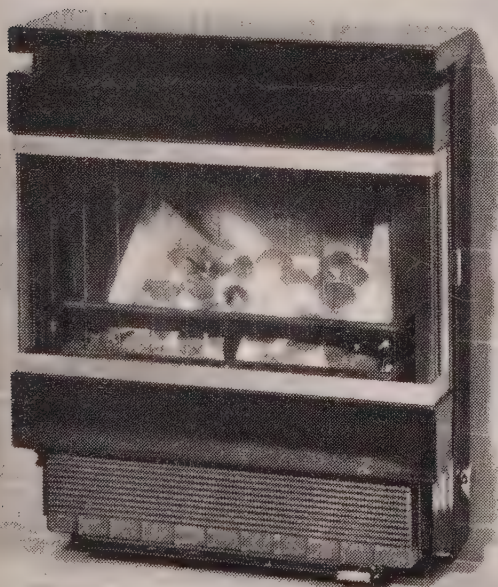
The plant manager is Mr. Stanley Oliver, of Whitchurch, Cardiff, who managed the old Crown Fuel Works, and previously held posts of increasing responsibility at Maritime, Nantgarw and Cwm Coke ovens, and the Phurnacite plant at Aberaman.

The plant is in the South Western Region of the National Coal Board's Coal Products Division (Regional Manager, Mr. J. P. White).

N.I.F.E.S. Chairman

Sir Julian Pode has succeeded Sir Leslie Hollinghurst as part-time Chairman of the National Industrial Fuel Efficiency Service.

The 36th international congress on industrial chemistry will be held in Brussels from 10 to 21 September, 1966. Already the number of participants has reached 1,350, with more than 600 intensions of communications registered. Further information from the Federation des Industries Chimiques, 49 Square Marie-Louise, Brussels, 4.



A roomheater burning Multiheat ovoids

CONTRIBUTIONS TO CLEANER AIR

Industrial and Commercial News

HEAT METERING

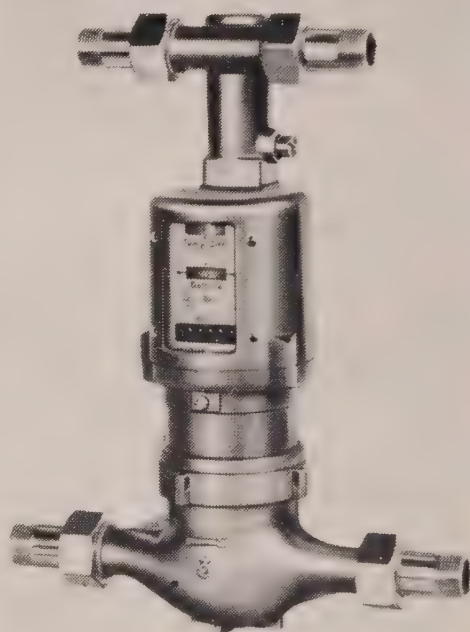
One of the problems associated with district heating, or group heating as it is now more accurately called, has been that of measuring the heat supplied, in the form of hot water, to each house or other premises. Without a meter, experience has shown there can be a serious wastage of heat, enough perhaps to make a scheme uneconomic. This question was discussed by Dr. Reid, of the National Coal Board, in his paper to the Eastbourne conference last October.

The increase in single source heating has led to a growing demand for accurate heat metering systems, and we have received information about the Pollux meters marketed by Shandon Control Systems Ltd. (65 Pound Lane, Willesden, N.W.10) which are now being produced at a rate of over 500 a month.

Registering heat consumption in Btu allow charges to be made to the consumer in exactly the same way as for gas and electricity.

The Pollux instruments were the first of their kind to be produced and have been constantly refined and improved over the years. They determine accurately the amount of heat removed or added to a heating or cooling circulating system by continuously forming the product of flow rate and instantaneous temperature difference between outflow and return water. After fitting, they operate on a purely mechanical principle and require no external power supply.

There are two models, both essential in their particular fields. The CEKA model is used mainly for determining heat consumption in flats, shops, lecture rooms, small workshops and houses, etc., and comprises an accurate propellor-type water meter, two carefully-aged bi-metallic temperature sensing elements and an integrating



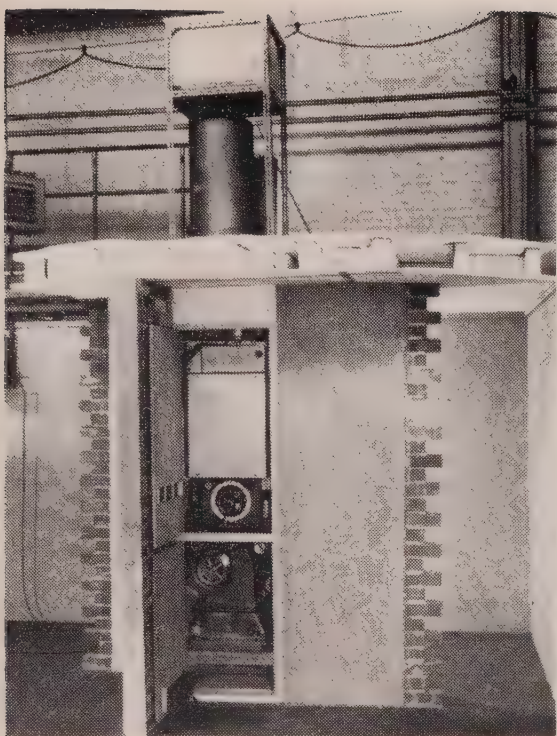
The Ceka Heat Meter

mechanism, all combined in a single unit. The meter is installed between the outflow and return pipes in pumped circulation systems and the heat consumption, temperature difference and flow rate are clearly displayed and easily read from the dial on the meter body.

The CEZET II model is mainly for district heating schemes, central heating installations and heating and cooling plants where water is used as the transfer medium, and is a master unit. It comprises a highly-accurate water meter, of special corrosion resistance, with a rapid-response temperature-difference system using two mercury-filled temperature sensors connected by capillaries to an integrating mechanism.

Warm Air Unit

A new oil-fired combined indirect warm air unit is being developed by



The Redfyre Centramatic 80 boiler

Redfyre Ltd., of Thorncliffe, Sheffield. Very compact it is only 2 ft. 1 in. square and, as shown here incorporating the new Redfyre Centramatic 80 boiler, is 7 ft. high. This picture, taken in the Company's Development Department, shows how the unit could appear incorporated in a house. At the top of the unit is the boiler, fully insulated for heat and sound and with a co-axial fan supplying combustion air to the burner. Beneath it is the centrifugal fan with its adjustable pulley and the circulating pump alongside.

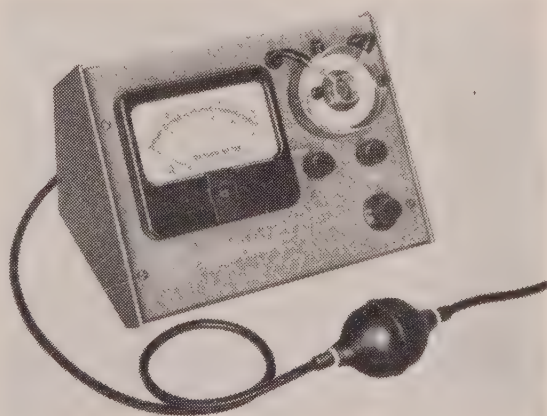
Smokeless Scrap Burning

Lees Hall and Sons Ltd., of Newhaven, Sussex, have sent us their brochure on their burning-off furnaces, which are specially designed for dealing with scrap armoured cables. Burning gas or oil, these furnaces incorporate a smoke consuming chamber—"designed to satisfy the requirements of the alkali inspection department". It is said that copper is undamaged by the burning off process, and that can be recovered un-oxidized in ingot form.

"Landlord" Controller for Off-Peak Electricity

The widespread use of electric off-peak storage heating in blocks of rented flats and offices has created a growing requirement by local authorities and private developers alike for a control system which will enable landlords to make the most economic use of this form of central heating. The object is to keep the premises at a comfortable temperature for the tenants without the landlord having to pay for more power than necessary being fed to the storage heating during the off-peak charging period.

To meet this need, Satchwell Appliance Controls Limited, a member of the Elliott-Automation Group, has developed the Satchwell "588" Integrating Controller which limits the off-peak charge given to the storage heating to the amount required to balance the heat lost from the building during each 24-hour period.



Oxygen Measurement

The photograph above shows a new portable, direct-reading instrument recently introduced by Shandon Scientific Co. Ltd., which enables oxygen concentrations in gaseous systems to be determined in a matter of seconds. This YSI Oxygen Meter Model 52 is battery operated and weighs only 5 lb.

Midac is the name given to the dust collection appliances of the Midland Heating and Ventilation Co. Ltd. (Bedford Road, Birmingham 11). The company issues informative illustrated publications on their wet dust, dry dust, and cyclonic dust collectors.



At left we show the new "Porta Bella" portable heater using bottled gas, which should be of special interest where space heating combined with mobility is required. Manufactured by Infradex Ltd., 21A Avenue Road, Southgate, London N.14

Technical Information

The Metropolitan Engineering Co. Ltd. (47 Whitechapel High Street, London E.1) issue sensible technical information bulletins, in which the emphasis is on information rather than promotion. Two of the latest are on "Light Load Running of Oil-fired Boilers and the advantages of a Thermal Storage System", and "Stand-by and Lightly Loaded Boilers". The company specializes in the prevention of soot emission from oil-fired heating boilers. They will be glad to add to their mailing list the names of readers who may be technically interested.

A Cry from Rural Wales

Unheralded, the following contribution arrived from Mrs. E. M. Wood, of Cilycwm, Llandovery. We nearly said it would be more appropriate in some other publication, but then had second thoughts.

HOW MARVELLOUS . . . does the S. for C.A. really live at 'Field House'? Then I feel they must be harassed with air pollution akin to that which often drives me up the wall of my little house in the fields.

Oh yes, I do burn smokeless fuel in my small cooker, not so much to save myself the irksome and messy flue cleaning, but so that my neighbours over yonder shall not see what time I get up.

There are many and varied irritations. Why do the outdoor workers always choose a fine day to clean out the barn and to burn all the fertilizer bags? Just so that myriads of charred paper locusts descend upon my whiter than whites.

Another day, V.I.P. visitors. I

polish my heirlooms and lay front room tea, throwing open the window to breathe in the glorious country air, only to hear ominous sounds from the tractor shed. Very soon the great beast creeps slowly round the buildings to windward. The greedy jaws of the hydraulic shovel opening to take mighty bites from the huge mound of manure that has been accumulating over the winter.

That first crusty mouthful releases all the concentrated odours and pent up steam from within, which hovers in the still, sunny air, and permeates the whole household. No good shutting windows, the foul gases creep under the doors and get into your very soul, like tribal incense.

Maybe the local B.R. up line has been dieselized, but so have the Landrovers belonging to my sons-in-law. The delivery lorries also. They grunt and blow their exhausts as they struggle to turn in the yard. Phew . . . why do they always come at mealtimes?

Come August holidays, please book me in at 'Field House' for some change of air . . . Good old London . . . here I come.

Gas Pipeline from Netherlands "Feasible"

The construction of a submarine pipeline across the North Sea, to carry natural gas from the Netherlands to Britain, is quite feasible. This is the conclusion of a technical report of a panel of experts set up by a joint study group of the Gas Council and N.V. Nederlandse Aardolie Maatschappij (Gas Export).

They consider that the most practicable route for such a pipeline is the direct crossing from the Netherlands to Britain. On this route the pipe could be buried with up to 10 ft. cover by known methods. On other routes surveyed, the presence of a rock seabed and other factors would present formidable laying and burying problems. Much longer land lines would also be needed.

Estimates of both capital and operating costs are now being prepared.

N.C.B. Smokeless Fuels

A "Note on Progress" for the year 1965, issued by the National Coal Board, contains the following information on the new fuels:

Work on the Board's new smokeless fuels continued during the year. At Coventry the Board's first full scale commercial plant for making "Home-fire"—a fuel for the open fire—is now being commissioned and will build up to full production at the rate of 650,000 tons a year.

A new plant, for making "Multi-heat", a fuel suitable for roomheaters and for the open fire, started production at Cardiff in November. It will produce 110,000 tons a year and an extension is already being planned.

The first plant to produce "Room-heat", a smokeless fuel for roomheaters and open grates is also expected to begin production soon and will reach a capacity of 120,000 tons a year in 1966. More plants of similar size will be built as soon as the efficiency of the first experimental plant has been proved.

Clean Air Act "Silly"

A plea of guilty was entered at Leicester City Magistrates' Court for William Gimson & Sons, Limited, to six charges of permitting dark smoke to be emitted from its engineering works. Fines totalling £120 (£20 for each offence) were imposed.

The defending solicitor told the court that the Clean Air Act of 1965 was "silly" as any firm could avoid the regulations by sending steam up the chimney to lighten dark smoke and there would be just as much pollution as if the dark smoke alone was emitted. He said that the chimney in question was 100 ft. high and took away the products from burning wood waste which were not injurious to health.

Cars Without Carbs

A consortium of British companies has just paid £150,000 to a professional inventor for a new fuel system which does away with carburettor, fuel pump, air and petrol filters and cuts a new car's production costs by an estimated £20.

The invention is the brainchild of William Scott, who developed it in his Surrey back-garden laboratory.

Scott expects to rake in another £75,000 a year in royalties once it goes on sale next year to fit every popular make of British family car up to 1½-litres.

It will sell for about £12 and take about 40 minutes to fit to an existing car.

The car's petrol tank is modified to draw in air which pushes petrol vapour into a secondary storage tank. From this tank the vapour is fed directly into the engine. This, according to the inventor, gives more miles per gallon, no choke-wastage of fuel during cold starting and an end to evaporation problems. Other advantages claimed are a higher top speed, cleaner engine running, potentially longer engine life, cleaner exhaust, and less air pollution. Report from *Modern Motoring*, November, 1965.

North West Division

The Division held its customary joint meeting with the Institute of Fuel in Manchester on 7 December, combining a hot-pot supper with a discussion on the theme of "I've got a problem".



The Society's new transportable exhibition unit in use at a Clean Air Exhibition in Glasgow. In the picture (l. to r.) are Charles E. Stanger, Senior Smoke Inspector; Councillor D. M. Wordley, Convenor of Special Subcommittee on Smoke Control Areas, and Ian MacPherson, Technical Officer for Smoke Control Areas

NEW GUIDE TO S.I. UNITS

Newly-published as part of B.S.I.'s educational and publicity programme for promoting the metric change is an explanatory booklet on *The use of S.I. units*. It has been prepared on the recommendation of the B.S.I. Advisory Committee on Metric Conversion and Standards which felt that there was a widespread need for a "popular" explanation of B.S. 3763 *The International System (S.I.) units* published in 1964.

The U.K. is changing to the metric system at a time when a newly rationalized set of metric units is coming into international use. This is the *Système International d'Unités (S.I.)* and the U.K. is able to adopt it from the outset of the change.

It is expected that there will be considerable demand for the new publication in industry and in training departments, technical colleges and the like.

(PD 5686: one copy free, additional copies price 1/- each post free (usual

discount for bulk orders of 100 or more); from British Standards Institution, 2 Park Street, London W.1).

Diesel Smoke Resolution

The Inner London Local Medical Committee proposed the following resolution at the Annual Meeting of the Association of Executive Councils:

"That this Association considers (i) that the Government should instigate urgently further investigations of the effects on health of diesel, petrol and other fuel oil fumes; and (ii) that there is urgent need to strengthen the enforcement of the provisions for the prevention of the emission of excessive amounts of smoke and visible vapour by road vehicles in view of the road hazard and nuisance caused and the possible danger to health."

AIR POLLUTION ABSTRACTS

836. Survey of lead in the atmospheres of three urban communities: a summary. Ludwig, J. H. (*Am. Ind. Hyg. Assoc. J.*, May—June 1965, **26** (3), 270—284). A study on the concentration of lead in the atmosphere in Cincinnati, Philadelphia and Los Angeles was conducted during a one-year period (June 1961 to May 1962) under the over-all direction of a working group composed of members of the U.S. Public Health Service, California State Department of Public Health, American Petroleum Institute, Automobile Manufacturers Assoc., E.I. du Pont de Nemours and Co., Ethyl Corp. and the Kettering Laboratory of the University of Cincinnati. The annual average concentrations ranged from 1 to $2\mu\text{g}/\text{m}^3$ in Cincinnati, $1\text{--}3\mu\text{g}/\text{m}^3$ in Philadelphia and $2\text{--}3\mu\text{g}/\text{m}^3$ in Los Angeles. In heavy traffic, the lead concentrations averaged $14\text{--}44\mu\text{g}/\text{m}^3$ in various locations. Blood and urine samples analysed for lead were within the accepted normal range for humans, with the exception of a few persons subjected to occupational exposure. Factors such as the sex of the individual, smoking habits and exposure to automobile exhaust affected the lead content of blood, but appeared to be independent of each other. The findings are discussed.

837. A portable apparatus for the calibration of atmospheric sulphur dioxide recorders in the field. Barber, F. R., and Brinkworth, D. C. (*Int. J. Air Water Pollution*, September 1965, **9** No. 9, 577—579). In the apparatus described air is drawn through a soda lime tower and after passing through a flow meter enters a mixing chamber where it meets and mixes with a metered supply of 100 p.p.m. SO_2 in the air. A uniform gas mixture is produced in this way and can be fed directly to the recorder. A five-point calibration takes about 1 hour and is repeatable to within ± 2 p.p.h.m. at each level.

838. Oxygen-Lanced open hearth furnace fume cleaning with a glass fabric baghouse. Herrick, R. A., Olsen, J. W., and Ray, F. A. (*Journ. Air Poll. Contr. Assn.*, January 1966, **16**, No. 1). This installation, the only application of a baghouse in oxygen-lanced open hearth fume cleaning in the United States, is considered a

success. After the equivalent of 10 months continuous service, less than two per cent of the 800 bags have been replaced because of possible wear. Operating experience, compared to the electrostatic precipitators in another open hearth shop at the Sparrows Point plant, show that cost is no more than if a precipitator had been installed, and operating and maintenance expenditures are markedly less. Outlet dust loading has been measured at 0.0007 grains per cubic foot. The relationship of gas volume to pressure drop differs by less than 10 per cent from the prediction based on a pilot scale study. It is the authors' opinion that this baghouse is properly applied to the cleaning of waste disposal gases from a single oxygen-lanced furnace.

839. The Quantitative Determination of Benzo(a)pyrene in the Air of South African Cities. Louw, C. W. (*Am. Ind. Hyg. Assoc. J.*, September/October 1965, **26**). The atmospheres of three South African cities have been investigated for the presence of polynuclear hydrocarbons. Standard techniques were improved and applied for separation of benzo(a)pyrene from other polynuclear hydrocarbons. Ultraviolet-visible spectrophotometry at the $402\text{-m}\mu$ peak was employed for quantitative determination of benzo(a)pyrene. A correction factor for the interference of benzo(k)fluoranthene at the $402\text{-m}\mu$ peak was determined experimentally and applied to the results. It is believed that this method is more reliable than those presently used. Some benzo(a)pyrene concentrations are presented.

840. An Apparatus for Measuring Specific Electric Resistance of Dust. Eishold, H. G., (In German) (*Staub*, 1966, **26** No. 1, 11—14). A new apparatus for measuring specific electric resistance of dust is described. Comparative tests carried out with the measuring device used hitherto have shown that results are in good agreement. In the new apparatus each evaluation does not require the precipitation of a new dust sample every time. It permits continuous determination of resistance with only one dust sample, even in the case of rapid changes in the carrier gas.

841. Atmospheric Pollution in the Paris Region and its effects on health. (In

French) Labonde, J., *et. al.* (Pollution Atmospherique, October — December 1965, 7, No. 28, 530—565). The geographical distribution of pollutants—sulphur and black smoke—measured permanently at fixed sites, has led to the delimitation of special protection zones in Paris. The comparative growth of pollution is examined from site to site, the daily variations of winter pollutants in Rotterdam and Paris show a certain similarity. Cases of high carbon monoxide pollution caused by a conjunction of certain meteorological factors and motor traffic are reported and described. Lastly, the study of pollution of the atmosphere by bacteria and virus shows in the first results, that the pollution is especially high in enclosed spaces.

842. Hydrogen Sulphide Darkening of Exterior Paint. Wohlers, H. C. and Feldstein, M. (Journ. Air Poll. Control Assn. January 1966, 16, No. 1, 19—21). Hydrogen sulphide reacts with heavy metal salts in exterior paints to form a precipitate which discolours the paint. Variables of this reaction include: type and concentration of heavy metal in the paint, age and condition of the paint surface, concentration and time of hydrogen sulphide exposure as well as the temperature and relative humidity of the ambient atmosphere. Variables of this reaction will be reviewed in terms of literature references and field results in the San Francisco Bay area.

843. Atmospheric Pollution by Fluorine. (In German) Oelschlager, W. (Staub, December 1965, 25, No. 12, 528—532). Fluorine plays an important role among toxic air pollutants, because even a relatively small amount of it can be harmful for plants and animals. The main emitting sources of fluorine are plants producing hydrofluoric acid, aluminium, superphosphate and enamel; further, brickworks, metallurgical works and industrial plants consuming very high amounts of low quality coal. Fluorine contents of raw materials, fluorine emissions in different processes and harmful effects on plants and animals are reported. Finally, the measures to be taken to reduce fluorine emissions are briefly discussed.

844. Sources of sulphur dioxide pollution. Rohrman, F. A. and Ludwig, J. H. (Chem. Engng. Prog. September 1965, 61, (9), 59—63). The burning of coal and residual fuel oil is the main source of

pollution from sulphur compounds. In order to define quantitatively the specific sources emitting such substances a study has been made of sulphur values for those fuels and their usage patterns in important industries in the United States.

845. Problems of Electrostatic Precipitation and Requirements for further technical development. (In German) Hesselbrock, H. (Staub, October 1965, 25, No. 10, 402—409). Laboratory and operating tests of large precipitators show that particles of high conductivity retard precipitation processes. These particles locally increase the field intensity in the gas pores of the precipitated dust layer. As a result of back ionization, maximum charging of particles is prevented and efficiency is lowered. Methods to prevent this drop in efficiency are suggested and a modern nozzle-type precipitator in which the dust layer is removed by a scraper is described.

846. How the United States Looks at the Auto Exhaust Problem. Stern, A. C. (U.S. Dept. of Health, Educ. and Welf., PHS Div. Air Poll., Wash., D.C. 20201, 1965, 31 pp.). This paper was presented at the Air Pollution Congress of the Swedish National Clean Air Council, Stockholm, Sweden, May 5, 1965. The problem of auto exhaust is discussed in this paper under the various subject headings of: photochemical "smog" and its effects, air quality standards and criteria, pollutant levels in U.S. air, some recent issues, vehicular emissions, evaporative losses, crankcase emission, recent experience with blow-by systems, exhaust emissions, maintenance, fuel modification, afterburners, recent developments affecting afterburners, the future for afterburners, engine modifications, new-type engines, particulate matter from auto exhaust, pollution inside passenger compartment and diesel engines. There is also a bibliography of 20 references and 22 pages of added information, mostly tables, graphs and photographic reproductions.

847. Marine Transport of Liquefied Natural Gas. Clark, L. J. (Proc. The Inst. of Mech. Engineers), 1965—66, 180, Part II). The paper describes the research and development work which led up to the full-scale trials in 1959 for the transportation of liquefied natural gas by sea in the "Methane Pioneer". This is followed by a résumé of the design requirements, building techniques and subsequent operating experience of the

first two commercial ships which entered service in 1964 for the regular carriage of liquefied natural gas from Arzew in Algeria to Canvey Island in the Thames. The unusual and varied design and engineering problems arising in these developments are described as well as the close liaison and co-operation of the various organizations concerned that made the successful conclusion of the project possible.

848. Air Pollution and Public Health. (In Dutch) Burema, L. *et al.* (Ned. Tijdsch. Geneesk. (Amsterdam) February 1965, 109, 257—260). The authors have studied mortality due to lung cancer and chronic bronchitis in the cities of Amsterdam and Rotterdam, comparing it with the corresponding figures for the rural provinces of Friesland, Groningen, Zeeland, Drente and the mining province of Limburg. They have reached the conclusion that air pollution is at best a minor factor in the pathogenesis of lung cancer. There appears to be no simple explanation for the increased mortality caused by chronic bronchitis among the male inhabitants of Amsterdam and Rotterdam since 1950. This phenomenon has not been observed in the other regions under review, and may be associated with the quality of the air in large cities.

849. Combustion Apparatus for Internal Combustion Engine Exhaust Systems. Lucas, J., Ltd. (Brit. 1,008,663, 3 November 1965, 2 pp.). The object of the present invention is to provide convenient combustion apparatus for incorporation in the exhaust system of an internal combustion engine, and whereby at least a proportion of the noxious gases can be burnt. Apparatus according to the invention comprises in combination an elongated casing having an exhaust gas inlet at one end, a combustion chamber mounted in spaced relationship within the upstream end portion of the casing, said combustion chamber having a hemi-spherical end adjacent to the exhaust gas inlet, a tubular part extending downstream from the combustion chamber and in communication therewith, said tubular part defining a mixing zone at its upstream end, an air chest surrounding said casing, a passage through which air from the air chest can be directed to said mixing zone, means in the space between the casing and the tubular part defining two alternating series of side-by-side longitudinally extending passages of which the one series establishes communication between the

exhaust gas inlet and the mixing zone and the other series establishes communication between the combustion chamber, and an outlet at the end of the casing remote from the inlet.

New Gas Research Station

The Gas Council is to establish a new Engineering Research Station in one of the development areas, Sir Kenneth Hutchison, Deputy Chairman of the Council, announced in London recently. Part of the station's work will be the study of mechanical engineering problems connected with Gas Council plans now being made to handle all the natural gas that may be discovered in the North Sea.

Head of the Engineering Research Group, Sir Kenneth stated, will be Mr. J. L. van der Post, who was appointed Research Engineer at the Council's London Research Centre in July, 1964. Since then he has been building up an engineering research team which will form the nucleus of staff at the new station.

By 1970 the number of staff may have risen to 130, and they will be studying mechanical engineering problems in the production as well as the distribution of gas.

Leeds Report Wins Award

In our Summer, 1965, issue we reviewed and praised the report of an investigation into air pollution made by the Leeds Junior Chamber of Commerce. The report has since then taken a prize in the International Junior Chambers' competition in Sydney, Australia, and has now won the Sir John Dodd trophy for the best report by Junior Chambers of Commerce in this country.

In our review we expressed the hope that this excellent survey of the problem would encourage other Chambers of Commerce to do something similar. We now learn that it is the subject of a Feasibility Study by three Chambers, Derby, Rotherham, and Stockport. This may lead to a report on a national basis.

SSFF

SERVICE TO LOCAL AUTHORITIES PROMOTING CLEAN AIR

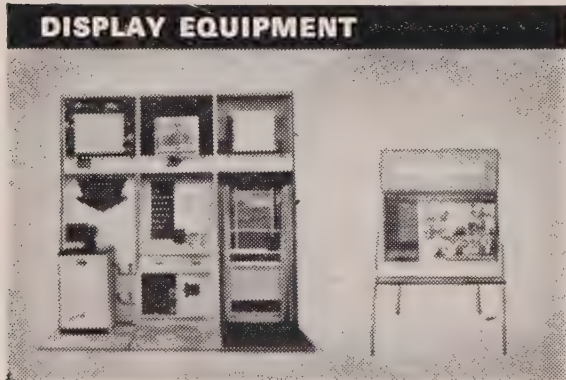
STATIC EXHIBITIONS



MOBILE EXHIBITION UNITS



DISPLAY EQUIPMENT



LITERATURE



Local Authorities establishing Smoke Control Areas or organising "Clean Air" campaigns, House Improvement or Conversion schemes should take full advantage of the technical advice and assistance offered free of charge by the Federation. Very many Local Authorities up and down the country have been assisted with the Federation's static and mobile exhibitions, and portable display equipment; and more than 1,000,000 copies of the booklet *Clean Air for You* (now being revised) have been distributed to date.

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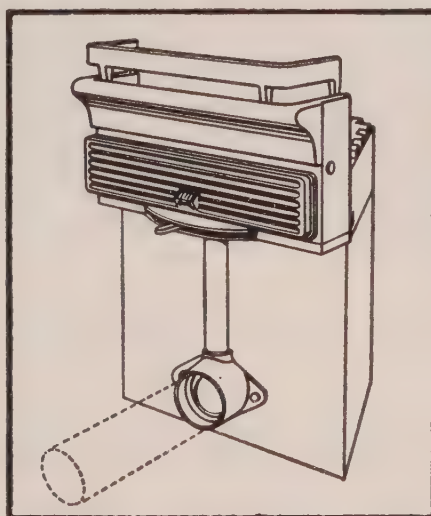
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*Sue Jones likes
watching pictures in the fire.*

*Her dad
(being older and more demanding) likes
a cosy room with no chilly corners,
a hot bath in a warm bathroom,
and the comfortable feel of money in
his pocket **after** he's paid the fuel bill.*



a living fire
(in a modern room heater)
keeps them both happy



and Mrs Jones isn't doing too badly, either. Because their modern room heater does a lot more than provide a friendly glow and wall-to-wall warmth. The particular one they've got has a high-output back boiler that gives her plenty of hot water whenever she wants it. Plus room to room warmth from radiators round the house. And she has a lot less cleaning to do. Not only is the room heater itself much easier to clean but burning smokeless fuel keeps the whole room cleaner. Besides being just right for smoke control areas. So, from that cosy fire, the Joneses get everything they want for a comfortable home. They get it cheaply, too. (Remember that money in dad's pocket?)



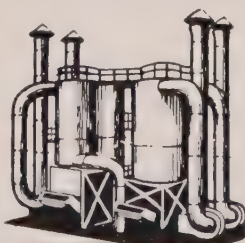
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Issued by the National Coal Board



MULTI-CELL CYCLONES

Holmes-Rothemuhle Multi-Cell Cyclones have been designed to reduce stack emissions from stoker and pulverised fuel fired boilers and are an inexpensive and efficient solution to many of the problems involved in the collection of dust and grit particles in the higher size ranges (10 microns and above).



WET ARRESTORS

When the collection of dust or fume in the form of a sludge or liquid effluent is acceptable, or indeed desirable, the Holmes-Schneible Multi-Wash System offers many advantages including high efficiency. An efficiency of 99% for all particles above 3 to 4 microns can be guaranteed.

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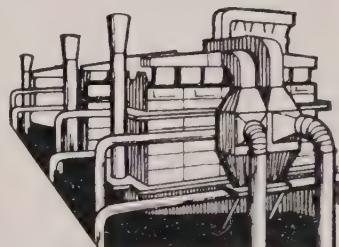
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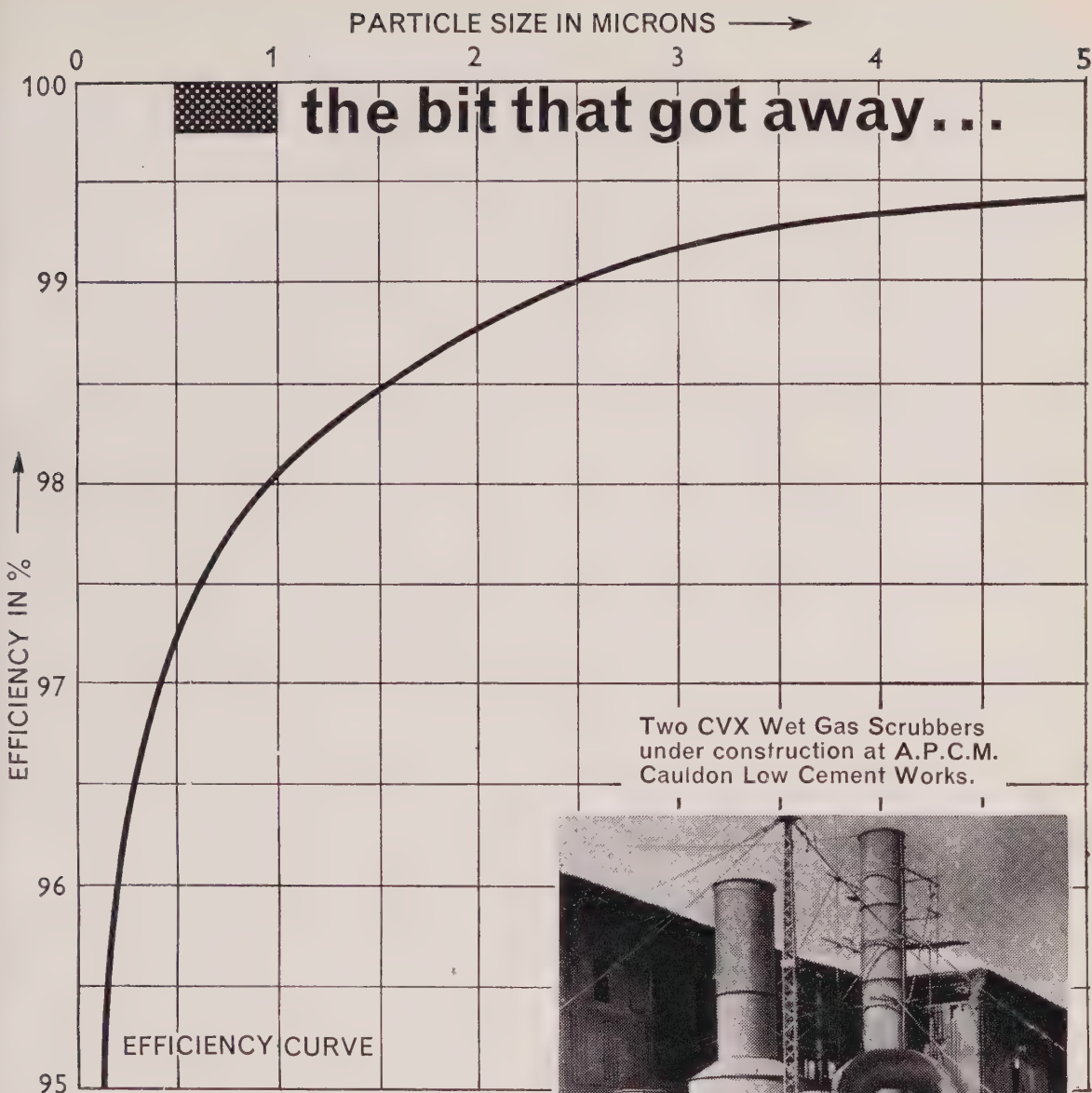
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Holmes Bag Filters incorporate design features which make them particularly suitable for applications where high dust burdens are encountered or where dust of an adhesive nature has to be collected. Efficiencies in excess of 99% for all particles, including those of sub-micron size can be guaranteed.

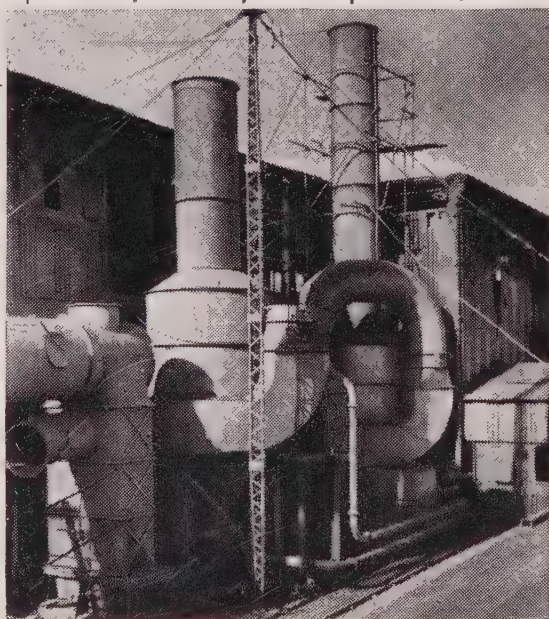


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HIGH EFFICIENCY SCRUBBER GUARANTEES AIR CLEANER THAN EVER BEFORE

The CVX Wet Gas Scrubber (*patented*) removes dust, fumes and absorbable gases with an effectiveness never before approached by any other means. Big claim, maybe, but we can prove it. Look at the curve above and ask yourself: are you doing as well? For clean air all the time, at lowest cost, you must install a CVX Wet Gas Scrubber.

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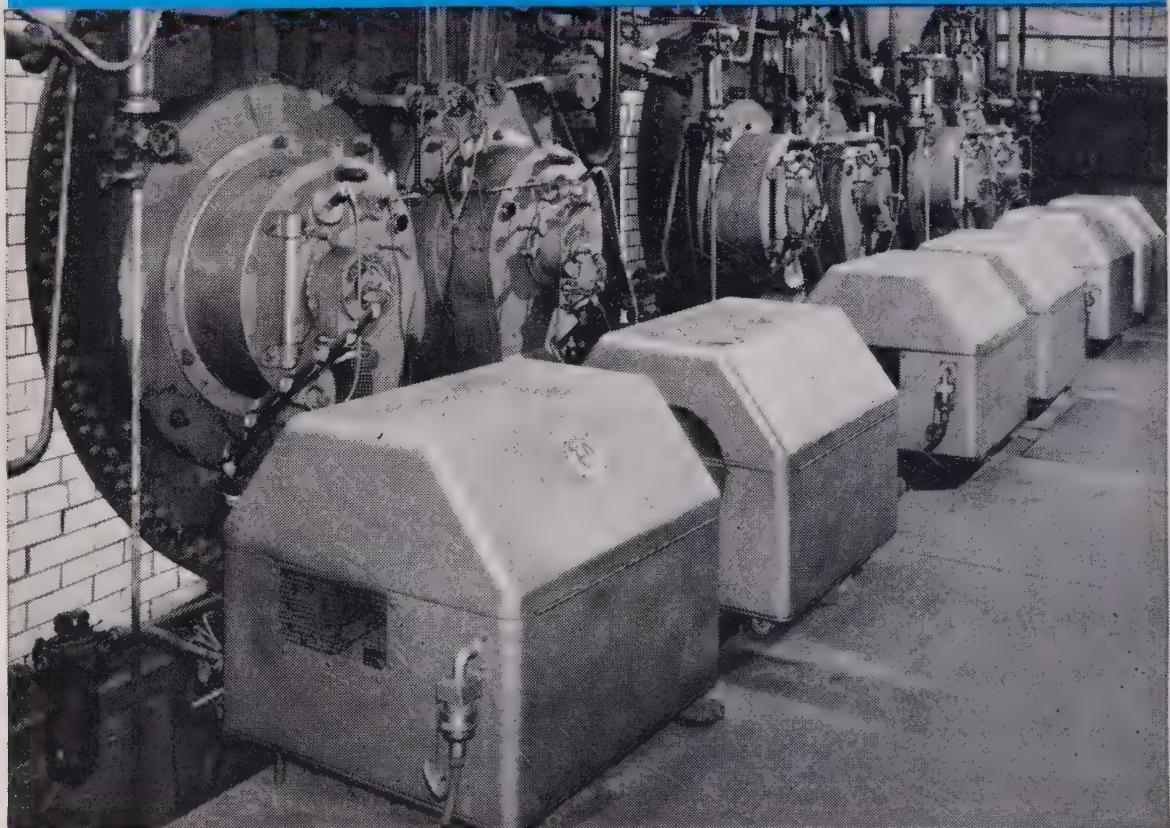
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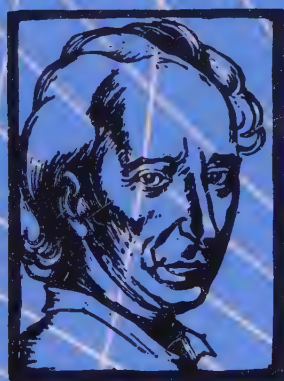
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JOURNAL OF THE
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No. 138 ★ SUMMER 1966 ★ 3s.

In this Issue

Address by Robert Mellish ★ The First Ten Years of the Clean Air Act
Reluctant (Scottish) Authorities ★ The Quality of our Environment
B.C.U.R.A. ★ Papers for the London Congress

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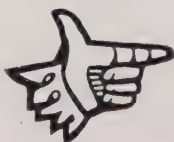
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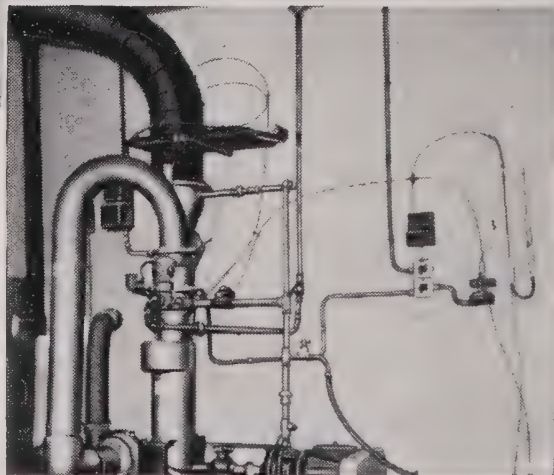
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CVX High Efficiency Wet Gas Scrubber arresting toxic dust and fume, contained in a nitrogenous atmosphere at 800°C, discharged from an electric resistance furnace.

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(it makes sense)
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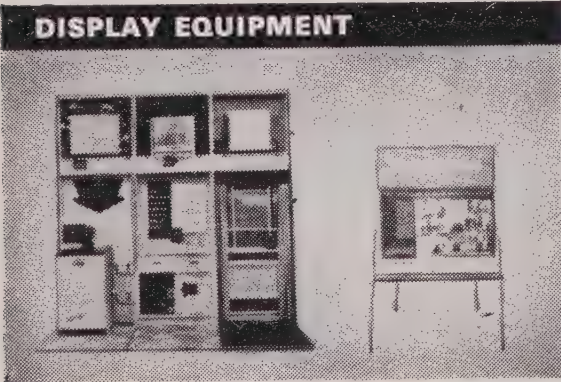
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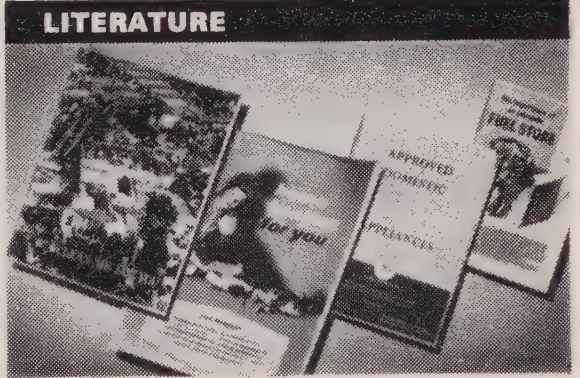
MOBILE EXHIBITION UNITS



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LITERATURE



Local Authorities establishing Smoke Control Areas or organising "Clean Air" campaigns, House Improvement or Conversion schemes should take full advantage of the technical advice and assistance offered free of charge by the Federation. Very many Local Authorities up and down the country have been assisted with the Federation's static and mobile exhibitions, and portable display equipment; and more than 1,000,000 copies of the booklet *Clean Air for You* have been distributed to date.

S.S.F.F. Service
to Local Authorities
promoting Clean Air

For a full list of the services offered by the Federation, please refer to the booklet 'S.S.F.F. Service to Local Authorities' which is available on application to the Federation. This booklet also contains details of the various exhibitions and display equipment available, and a list of the many Local Authorities who have been assisted by the Federation.



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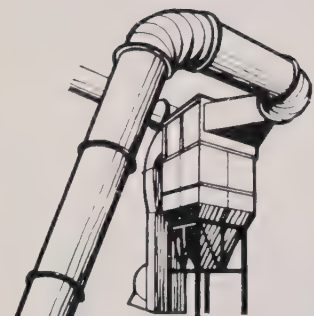
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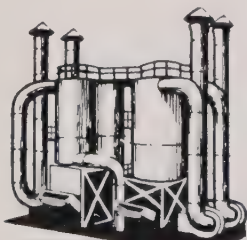
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Holmes-Rothemuhle Multi-Cell Cyclones have been designed to reduce stack emissions from stoker and pulverised fuel fired boilers and are an inexpensive and efficient solution to many of the problems involved in the collection of dust and grit particles in the higher size ranges (10 microns and above).



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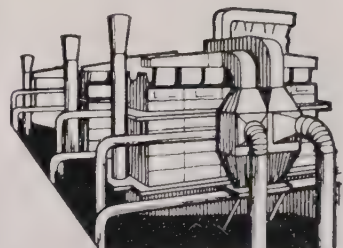
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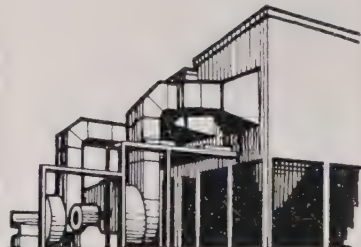
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of all the forms of smokeless heating, one gives you efficiency, economy and real, cosy, friendliness □
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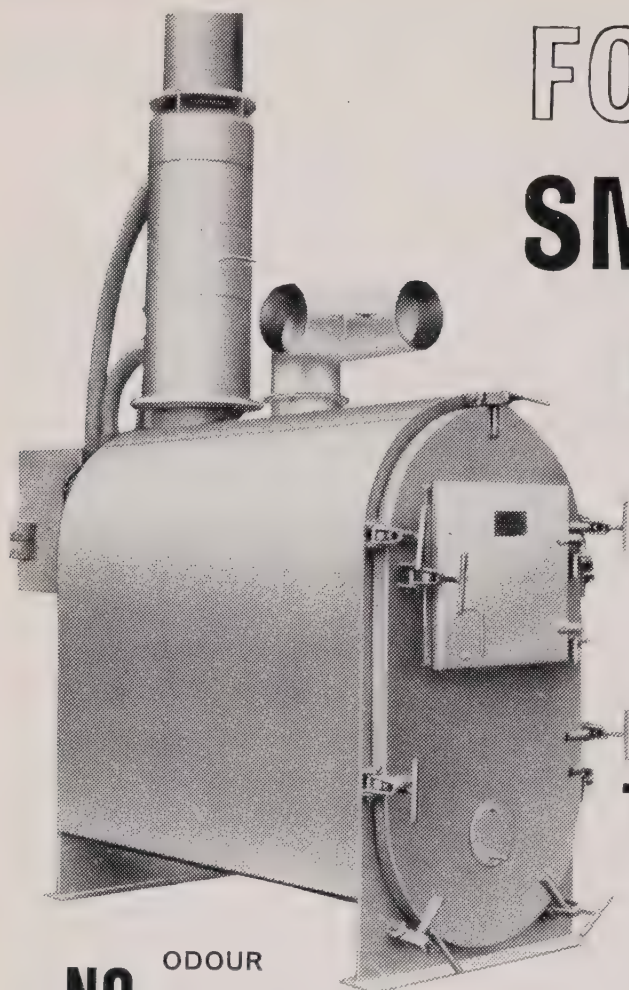
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Members and other U.K. delegates who are linguists and will be attending the Congress in October are invited to assist in welcoming overseas delegates at the social events, etc. Offers of co-operation will also be welcomed from members able to meet and escort overseas delegates arriving at London Airport or rail stations. Please write or phone the Director or Assistant Secretary.



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SMOKELESS AIR

Vol. XXXVI No. 138

Summer 1966

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*Ships, towers, domes, theatres and temples lie
Open unto the fields, and to the sky;
All bright and glittering in the smokeless air.*

SMOKELESS AIR

The Defence of the Environment

ON another page we review a recent report, *The Quality of our Environment*, which is the work of a U.S. Presidential Committee and is published from the White House itself. Air pollution is of course one of the factors affecting the environment that is discussed in the report, but it is not this which has particularly interested us. What is said about air pollution is sound but not particularly new. What we did find stimulating about the report is that it considers the environment *as a whole*, and implies a co-ordinated defence against the many assaults being made upon it.

These assaults are so varied in their character that at first sight there appears to be little purpose in thinking of a co-ordinated or unified defence. Air pollution is the concern of this journal and of the NSCA; water pollution is a separate and different problem, and so is the pollution of the soil. And then again, without physical pollution, but degrading the environment just the same, are such problems as noise and what the report refers to as visual pollution—the wastes and the litter that produce ugliness and destroy amenity.

Although these enemies of the environment have grown independently of each other, and although their prevention or control demands quite different means and methods, they all have one thing in common: they are whittling away the goodness of our environment. By goodness we mean

the qualities that make the environment all that it should be in a truly civilized community. Such qualities are many and varied, physical and mental, and together they make the *milieu* in which we live our days.

The question that arises is whether we have been fighting too many isolated battles against the pollutants, each without thought of the others, and all without thought of the environment itself. Might not each of the many defensive actions be strengthened by co-operation and co-ordination, and above all by an awareness of the fact that the purpose of all the separate efforts is the same—the safeguarding of the environment?

This seems to be what is happening in the White House, and it suggests that much of value might come if we in Britain were to start thinking on similar lines. At present there is little or no contact between the bodies which are defending one sector or another, and perhaps there is little immediate prospect of such developments—except maybe if promoted from a level akin to that of the White House. To put forward this idea is not to do more than to try to stimulate thought about it, although one or two practical instances may be cited. Thus there is little or no co-operation between those interested in noise abatement and those interested in air pollution prevention in the field of road vehicle control. And, in another

sector, it has been suggested that air pollution should be more closely allied with water pollution—one reason put to us being that there is no association like the NSCA to promote clean water. And again, where does air pollution start and end? Should it include, for example, pesticide control, to which the U.S. report gives much attention?

It may be that in time, as the traditional reasons for air pollution prevention are successfully overcome—and with most of these we now seem to be over the hump—it may be useful for the Society to extend the scope of its activities and to become one of the leaders in a grand alliance for the defence of the whole environment.

Revising the Clean Air Act

The tenth anniversary of the Clean Air Act was both celebrated and made the occasion of a critical examination at the meeting of the Society held in London in May. The meeting, and the luncheon which preceded it, are reported in this issue. One of the main purposes of the meeting was to ascertain what improvements and revisions to the Act were needed.

The consensus of opinion, as shown by bringing together the considered views of the Society's Divisions, is that, on the whole, the Act has proved to be a very good one. A number of improvements have been proposed, but the surprising thing is that these should be relatively few in number and modest in their demands. Nothing of a fundamental nature has been suggested. What seems to be a general attitude is that, although certain revisions would be useful, it is much more important that the Act should be implemented more effectively by many local authorities.

We know, because the situation can be accurately determined, how much progress is being made under the Act in the prevention of domestic smoke by the establishment of smoke control areas, and we know which

local authorities are doing a good job and which are doing little or nothing. But what is being done, or not being done, with respect to industrial smoke? How much dark smoke continues to be emitted illegally and without action being taken? How effectively is Section 3 (new furnaces to be smokeless) being implemented, and what is the real extent of improvement with respect to grit and dust?

The admittedly rough and ready inquiry made by the Society some three years ago indicated a 50 per cent reduction in dark smoke emission, and 30 per cent in grit and dust, since the Act was passed. This may seem fair progress, but we are pretty sure that these figures are not reached everywhere. If there is sloth in implementing the Act on the domestic side there is likely to be sloth also on the industrial side, and it is knowledge that this exists that leads the representatives of the more conscientious authorities to demand a better use of the Act as it stands before improvements to it. After all, failure to enforce the Act cannot be kept hidden from visitors from other authorities, or from observers looking across a boundary line.

This raises a question that should perhaps be tackled before possible revisions to the Act are studied. How can failure to use it effectively be ascertained, and how, when deficiencies are determined, can they be remedied? Or have we not asked the right question? The views of readers would be welcome.

A.G.M.

The annual general meeting of the Society was held at the Connaught Rooms in London on 9 May, prior to the luncheon and the afternoon meeting reported on other pages. The meeting followed the customary pattern, with approval of the accounts and the annual report. The results of the annual elections were announced and accepted. These showed that Sir Alan Wilson and Mr. Stanley Cohen

had been the only nominations for the offices of President and Honorary Treasurer respectively, so that they were both re-elected. There were several changes in the election of divisional representatives to the Executive Council, the results in detail being as follows:

Scotland: J. Innes, J. Foreman, I. W. Wintour.

North West: W. E. Pollitt, F. Winder, H. Clusky, Dr. J. L. Burn, J. W. Rodgers, Professor A. B. Semple, E. W. Ward.

Yorkshire: E. M. Birtwistle, J. Goodfellow, E. J. Winfield, A. C. Saword.

West Midlands: W. L. Kay, S. Cayton, S. C. Beaumont, H. E. T. Lowbridge (co-opted).

South East: W. Combey, G. B. Courtier, J. S. Hodgins, J. Clancey, G. C. Stubbs, Dr. W. C. Turner, Mrs. M. E. Willison, Miss P. M. Bryant, A. W. Brown.

North East: L. Mair, Professor P. C. G. Isaac, Alderman B. N. Young.

East Midlands: T. Henry Turner, G. A. Hiller, A. Wade.

South West: G. W. Dhenin.

South Wales and Mon.: D. F. Bevan, Dr. J. L. Williams.

Northern Ireland: W. E. C. O'Brien (co-opted).

Among more familiar names missing from this list is that of Councillor Monteith of Glasgow and President of the Scottish Division, to whom due tribute for his long years of active work for clean air were paid at the recent annual conference of the Division. Mr. S. N. Duguid and Dr. J. S. G. Burnett, of the North West Division, and Mr. Bate of South Wales, all former members of the Council have been co-opted to that body, and Dr. Gordon Nonhebel continues as a member appointed by a national body (the Institute of Fuel) and not as a S.E. Division representative.

Newly elected members of the Council include: Mr. I. W. Wintour, Chief Sanitary Inspector, Edinburgh; Mr. E. W. Ward, Chief Public Health

Inspector, Warrington; Professor A. B. Semple, M.O.H., Liverpool; Mr. J. W. Rodgers, of the North West Gas Board; Mrs. M. E. Willison, an individual member and with the Solid Smokeless Fuels Federation; Miss P. M. Bryant, another individual member, who is a scientist with the U.K. Atomic Energy Authority; Dr. J. L. Williams, M.O.H., Aberdare; Mr. D. F. Bevan, Chief Public Health Inspector, Swansea.

Sir John Charrington

An interesting and pleasing item of business at the Annual General Meeting was a proposal, on behalf of the Executive Council, that Sir John Charrington be elected as a Senior Vice-President of the Society. The proposal, it need hardly be said, was carried with warmth and unanimity. This office has not been fully used in recent years, and it is gratifying to all who know him (or know of his good work for clean air) that Sir John should have been able to accept the nomination. The office of Senior Vice-President carried little responsibility in itself, but was included in the Society's Articles for the purpose of creating a step to the Presidency. In effect, Sir John becomes President-designate to succeed Sir Alan Wilson, whose term of office ends in May, 1967.

T. Henry Turner

The newly elected Executive Council, at a meeting on 9 May, had to accept the express wish of its senior Deputy Chairman, Mr. T. Henry Turner, that he should not succeed Mr. Goodfellow to the chair, which would have been the normal course. Mr. Turner felt that he was not robust enough to take on this responsibility, and characteristically he was frank and wise enough to say so. Those who know "T. Henry", at conferences, council, committee and divisional meetings, and at the Standing Conference, know how devoted he is to the cause of clean air—a devotion

made plain by this unselfish action. The junior Deputy Chairman, Mr. A. C. Saword, felt that he should serve in the senior position before agreeing to nomination as chairman, and therefore Mr. James Goodfellow has been re-elected for a further term. The second, or junior, deputy chairman elected at the meeting is Dr. W. C. Turner, member of the Executive Council and an active member of the South East Division for many years. Dr. Turner is Associate Medical Officer of Health for the Greater London Borough of Tower Hamlets.

Why Birds are Back

A glow of pleasure and interest, unusual on a Sunday, came over us when we read in the *Sunday Times* (Insight, 22 May) an ornithological

note headed "Why birds are back in London". It was about a report from Mr. Stanley Cramp, "a civil servant who lives in Bloomsbury, works in Soho, and by 27 years' unremitting work with binoculars and notebook has made himself the acknowledged expert on the bird life of Central London". Then comes (our italics): *He identifies the principal cause as the working of the Clean Air Act of 1956, now making a significant improvement in the London air.*

The note goes on to say that the clearer air of the capital is attracting many birds of passage not seen in London for more than a century. "A puffin was recently sighted walking along the Strand, and guillemot spent the night in St. James's Park."

We would have given much to see that puffin walking along the Strand.

The Reluctant (Scottish) Authorities

The letter, reported in our last issue, from the Minister of Housing and Local Government to local authorities in England and Wales who have made little or no progress with smoke control, has now been followed by one from the Scottish Development Department, on behalf of the Secretary of State, to laggard authorities in Scotland.

The letter begins bluntly: "I am directed by the Secretary of State to express his disappointment that in the ten years since the Clean Air Act was passed to your Council, in common with a number of other authorities in areas where smoke pollution is worst, you have failed to apply for confirmation of any smoke control orders". The letter is shorter than that addressed to the authorities in England and Wales, but the points it makes are similar.

It is said that the Secretary of State considers that greater progress with smoke control can and should now be made. "He would accordingly be glad

if your Council would now review their attitude to domestic smoke control; and he hopes that, as a result, they will arrange to let the Department have a planned programme of smoke control which they will thereafter take steps to implement."

The letter concludes with the warning that the response received, as well as that from authorities in England who have similarly been asked to review their attitude, will "enable the Government to decide whether they should seek an opportunity of asking Parliament to make smoke control a statutory duty".

The Authorities Listed

The letter gives a list of the burghs which were urged to carry out smoke control programmes in 1955 and again in 1963 and have not yet made any orders. It reads:

Cities: Aberdeen.

Large Burghs: Airdrie, Arbroath, Ayr,

Dumfries, Dunfermline, Greenock, Hamilton, Inverness, Kirkcaldy, Perth, Stirling.

Small Burghs: Alloa, Ardrossan, Armadale, Bathgate, Bearsden, Bishopbriggs, Bo'ness, Bonnyrigg and Lasswade, Brechin, Buckhaven and Methil, Burntisland, Cockenzie, Cowdenbeath, Culross, Cumnock and Holmhead, Dalkeith, Denny and Dunipace, Falkland, Fraserburgh, Galashiels, Girvan, Gourock, Haddington, Hawick, Inverkeithing, Irvine, Jedburgh, Johnstone, Kilsyth, Kilwinning, Kinghorn, Kinross, Kirkintilloch, Ladybank, Langholm, Leslie, Leven, Linlithgow, Loanhead, Lockgelly, Markinch, Penicuik, Peterhead, Prestonpans, Queensferry, Saltcoats, Stevenston, Stranraer, Tillinaculty, Tranent, Whitburn.

The letter has also gone to three burghs which have made little progress: Barrhead, Kilmarnock, Milngavie.

AUTHORIZED FUELS CIRCULAR

Circular No. 18/66 from the Ministry of Housing and Local Government to local authorities in England and Wales, is entitled "Clean Air Act 1956. Smoke Control Areas (Authorized Fuels) (No. 2) Regulations 1965".

The purpose of the regulations referred to is to include the new N.C.B. smokeless fuels "Multiheat" and "Roomheat" in the list of authorized fuels. As an appendix to the circular a summary is given of the solid fuels that are covered by authorizations so far, together with the appliances for which each is suitable.

NORTHERN IRELAND

The Ministry of Health and Social Services of the Government of Northern Ireland has issued to local authorities a circular (No. P.H. 8/66) on the supplies of open grate fuels in smoke control areas set up under the Clean Air Act (Northern Ireland) 1964.

The circular states that the supplies of gas coke are likely to be insufficient to enable demand for open fire solid smoke fuel in smoke control areas to be met solely or mainly by gas coke.

It therefore indicates that local authorities would be justified in paying grant for the replacement of an improved open fire by an appliance capable of burning hard coke, an electric heater, a gas room heater, or fixed oil burning appliances. And because the reactive open fire fuels are likely to be available, it would be equally justifiable to pay grant for the replacement of a coal fire by an improved open grate in cases where the owner or occupier wishes to burn these fuels. Further, it is the Ministry's view that local authorities should *not* designate improved open grates despite the shortage of gas coke.

We have just learned that the first smoke control area order for Northern Ireland has been confirmed by the Ministry for the Dundonald district of Castlereagh R.D.C.

Symposium on District Heating

The Institution of Heating and Ventilating Engineers is to hold a two-day symposium on District Heating at Church House, Westminster, on 21 and 22 March, 1967.

As well as papers which will deal with the preferred environment in relation to population growth, comfort, utility and amenity based on full central heating, other aspects on a national basis, i.e. health and economy, law and administration, technical and financial problems will be considered.

One of the main purposes of the Symposium will be to clarify the issues involved and will illustrate the generally unsatisfactory situation facing those who want to initiate a scheme before they can even start to consider the purely technical and mechanical problems. A comparison of present activity on the continent and in this country will be made.

There will be a cocktail party on the evening of the first day and there is every possibility that a small exhibition will be on hand.

Further details will be forwarded on request, from the I.H.V.E. at 49 Cadogan Square, London, S.W.1.

Address by Robert Mellish, M.P.

Joint Parliamentary Secretary, Ministry of Housing and Local Government

The Annual luncheon of the Society at the Connaught Rooms, London, on 9 May, was most successful and well-attended. The President, Sir Alan Wilson, was in the chair, and among the guests were Lord Kennet, Joint Parliamentary Secretary, Ministry of Housing and Local Government, Mr. Jeremy Bray, Parliamentary Secretary, Ministry of Power, Lord Cohen of Birkenhead, Sir John Charrington, Sir Hugh Beaver, Sir Gerald Nabarro, M.P., and a number of other representatives of Government Departments, learned and professional associations, and the national fuel industries.

The Guest of Honour was Mr. Robert Mellish, M.P., who was deputizing for his Minister, Mr. Crossman and who is in fact acting as Chairman of the official Clean Air Council. In replying to the toast of the guests, Mr. Mellish gave the following address, which was very warmly appreciated.

IT has been my privilege, since I have been the joint Parliamentary Secretary to the Ministry of Housing and Local Government, to take the Chair at the Clean Air Council meetings which are held at the Ministry, and I must say, and put on record, how impressed I have been with the quality of those who are serving as members of that Council, their knowledge and their ability. Indeed, I have found the Clean Air Council, to be one of the most exciting—believe it or not—meetings of its kind that I have attended, and I have become more than interested in their work as a consequence of the attitudes of individuals, than perhaps even I could have hoped for. And so I come here today, speaking as one who has attended those meetings. To start off

I have two apologies. First, on behalf of my own Minister, who would have been here today but for a prior engagement which he could not cancel, and who sends his very best wishes and regards to you all; and to apologize to all of you now, because I was due to speak at Eastbourne last year, and, again because of another engagement I had to cancel that visit.

Today, Sir, you are meeting at a time when you are commemorating the Clean Air Act as being in being for some ten years, and I think this is an appropriate occasion to review its progress and to examine difficulties and to confirm, if confirmation is necessary, the Government's attitude to some of the problems of that Act. As you know, the Act has got three main purposes: it is the control of dark smoke, the control of smoke and grit and dust from new installations, and the control of domestic smoke through the creation of Smoke Control Areas. And it is about the last I want to pay special emphasis this afternoon.

I want, first of all, to give you some facts. In the Black Areas of England—and in present company I don't think I need to explain what that term means—there are something like eight million premises altogether. Of these, about two and a half million have already been covered by Smoke Control Orders, and this is substantial progress, although I believe that the pace in some regions is far too slow. Greater London has by far the best record: half has already been covered by Smoke Control Orders, and there is good reason to hope that within five to ten years, the whole of Greater London will be one continuous Smoke Control Area.

Other big cities have shown notable progress. I would like to name Manchester and Sheffield as good examples, and some smaller local authorities are keeping pace in spite of their smaller resources. But the sad fact remains that some local authorities, in the very areas where smoke pollution is at it worst, have done little, or nothing at all to get rid of one of their biggest social evils. And so we must ask ourselves the question, "Why is this?" I think there are a number of reasons for the failure to get on with the job, and of course when you come to examine it closely, you find they do vary, area to area. I would like to pin-point at least some of them, because a great deal of resistance to smoke control is founded on ignorance and prejudice.

Some think that smoke control is too expensive. Well, like any other social service, smoke control does of course cost money, but in the long run the cost of not having smoke control is far greater, both in economic terms, and in terms of human misery. In the nature of things, we can't give precise figures about this, which is what makes it difficult to bring it home to everybody concerned. But we must accept this difficulty as a challenge and do everything we can to hammer home our need for smoke control. The country owes a debt to this Society for all the years of patient and hard work in this direction, work which has proved its worth beyond any doubt. And I would like to pay a tribute to the body of men who have done as much as any, and more than most, in the cause of clean air, and that is the Public Health Inspectors. They not only carry the burden of administering and enforcing the Act but they have played, and are playing, a principal role in obtaining public support for smoke control. And I know you feel as I do in this matter as you have clearly shown by your happy choice of Chairman of your Council.

One of the complaints about expense is that smokeless domestic, space and water heating of any sort costs more than coal. And it must be admitted that some ways do, but others do not, and there is a variety of choice open to the individual. Comparative

fuel prices can be misleading, since modern domestic heating appliances, using smokeless fuels are more efficient than the old-fashioned open-fire burning coal. But having said that, we must face up to two problems: The first concerns old people, particularly old-age pensioners and others living on small fixed incomes, who are accustomed to open coal fires. They find it difficult to adapt themselves to the very different technique of burning solid smokeless fuels. It is possible to have a tiny coal fire and still keep it alight. It may not give out much heat but it does not go out. In other word, economy and not heat is the main consideration, and with coal you can economize by putting less and less coal on the fire. With some open fire smokeless fuels, however, this cannot be done because you have to maintain a deep fire-bed otherwise the fire goes out. Now this does not mean that smokeless fuel will cost a great deal more to maintain the same amount of heat, but it does mean that to obtain a minimum standard of heating it must be used differently from coal, and the only way this difficulty can be permanently overcome is by patient education and demonstration by local authority officials and others. The Solid Smokeless Fuels Federation are playing a particularly valuable role in this field, and they are always ready and eager to help in individual cases as well as by mass demonstrations. And I know that their job is to sell smokeless solid fuel, but in so doing, they are incidentally helping us to overcome a human problem and it is right to recognize the fact. I should like to add that the National Assistance Board are willing to give special help to those in receipt of assistance to tide them over the first few weeks until they have learnt to use the new type of fuel economically.

Concessionary Coal

Next it would I think, be less than frank if I did not admit that in those areas where a large proportion of the population depend on concessionary coal, there are obstacles in the way of smoke control. Concessionary coal,



At the Annual Luncheon. Left to right: Sir Alan Wilson, President; Mr. Robert Mellish, Joint Parliamentary Secretary, Ministry of Housing; and Sir John Charrington, Senior Vice-President

and the agreement regarding substitutions for it in Smoke Control Areas, are not of course matters within my jurisdiction as a Minister, nor of that of my friend Mr. Bray of the Ministry of Power. It lies between the National Coal Board and the National Union of Mineworkers, but I know enough about them to recognize that these are not so simple as they seem at first sight. All I can say is that it is a difficulty which the beneficiaries ought to be trying hard to remove in the interests of their own well-being.

Now I have left to the last one of the most frequently heard objections to smoke control, that is the shortage of supplies of smokeless fuel, particularly solid smokeless fuel. This is, of course, a matter for my colleagues in the Ministry of Power, and it would not be right for me to trespass on their territory, but to have clean air we must, in practice, have smokeless fuel. Forward planning in the fuel industries must be very difficult, in an age of rapid and far reaching technological changes, of which the Gas industry has given us recent examples. There have also been difficulties in getting some new smokeless fuels into production, but these we hope are almost over. In spite of all this, however, the Minister

of Power is satisfied that overall supplies of smokeless fuel are, and will be sufficient to meet the demands of smoke control areas. Now this does not mean that every type of smokeless fuel, is, or ever will be available everywhere. This would be impossible. Supplies of anthracite, for example, are limited to what can be got out of the ground. But it does mean, however, that suitable supplies of smokeless fuel, of one type or another will be available everywhere. And, as you know, grant arrangements have been adjusted so that householders can get financial help to install, in place of their coal fire, appliances which will use the fuels which are freely available in the particular area. There have been many reports of shortages, but on investigation, so many of those reports have in fact, proven to be grossly exaggerated, and obviously blown up to create an attitude, an obstacle really, to the progress of clean air. It often seems to be the case of suppliers and customers not having adjusted themselves to the changeover. Now I do not believe that any Black Area Local Authority would be justified in refusing to begin or to continue smoke control, on the grounds that future supplies of smokeless fuel would be insufficient.

Most of you will know that in January my Minister wrote to all the local authorities in the Black Areas who have not made any smoke control orders and others who had done far too little. If I may say so, by the way, we had an enormous repercussion as a result, much of it quite abusive, for actually telling these people what they should have done. I am glad to say, however, that no fewer than 25 of these authorities have already either submitted orders, or are preparing to make them. And officers of my department are spending as much time as possible in visiting these authorities and any others who may have doubts or difficulties or need guidance in any way. These visits are of great value to the department and we hope that they are of equal value to the authorities.

A word about the future. Let me nail the Government's colours to the mast. We are determined to continue the process of ridding our black areas of smoke, we hope that this will be achieved voluntarily. If not, it ought to be plain to all that this nation cannot afford forever to treat the air we breathe as a cesspool.

Vehicle Exhausts

May I now just for the last few moments stress my own personal feelings on another aspect of this problem. This is with regard to carbon monoxide as a consequence of vehicle exhaust. Speaking personally and without any brief, I am not convinced of the advice that I have now received, that this, at the moment, is of no real threat. I cannot believe that this is so. I believe it needs a great deal more investigation and study, and I would make the one very obvious point to everybody here, that in fact we are producing in this country something like 10 million vehicles at the moment, rising to 14 million by 1970 and probably 20 million by 1980. I cannot believe that, unless something is done in the very immediate future to try and control the amount of poisonous fumes that come from the average car,

they cannot but be a tremendous menace to the health of this nation. I know there are grave, serious doubts as to the feasibility of this, there are those who will say that they don't believe it is a menace today. I ask those who say that, to consider this aspect of it, certainly with the number of cars coming on the roads, and traffic jams being part of our life, surely, surely, this is something we ought to be giving our attention to? I give notice now, in spite of all those who I may disturb by saying it, that the Clean Air Council have not given this one up. It is coming back on the agenda, and we will want more satisfaction than we have had in the past.

I conclude by saying to you, Sir, and to your colleagues here, as one who has become interested in your subject as a result of the job that I have had in this last 18 months, that my Government, and my Minister, will do what they can to back up this Society, who have done, and are doing, a first-class job for Britain.

Conference Report Published

A report of the Conference on "Industrial Energy Developments and Costing", held by the Combustion Engineering Association in conjunction with the Institute of Cost and Works Accountants at Harrogate in November last, is now published. Copies may be obtained from the Director of the C.E.A. at 70 Jermyn Street, London, S.W.1, at 25s. for members and 30s. for non-members.

The C.E.A. announce that their President for the year 1966-7 is the Rt. Hon. Lord Beeching.

John S. Owens Prize

The Royal Society of Health announces that the John S. Owens prize for 1966, amounting to 50 guineas, is offered for an essay on "Central heating; its effect upon vegetation". Full particulars can be obtained from the Society at 90 Buckingham Palace Road, London, S.W.1.

The First Ten Years of the Clean Air Act

Is Revision Needed?

THE annual lunch of the Society in London on 9 May was followed in the afternoon by an open meeting of members. There was a very good attendance and a first-class platform, including Sir Hugh Beaver and Sir Gerald Nabarro, M.P. The chairman of the Executive Council, Mr. James Goodfellow, presided.

Sir Hugh Beaver

Sir Hugh was the first speaker. He started his brief and pithy address by saying that he felt somewhat like a Rip van Winkle. Looking back to the reception given to his committee's report in 1954, he was sure that documents on social problems of this kind must be addressed to the public in language they would understand and that their recommendations must be practicable and phrased so that one could see how they could be carried out.

Air pollution would go on for ever, but Governments only remained in power as long as they represented public opinion. The impetus provided by the 1952 smog had now gone, and the National Society for the Clean Air should not address its message to technical experts or to Governments, but to exert pressure on local authorities and public opinion.

Sir Gerald Nabarro

Sir Hugh was followed by Sir Gerald Nabarro, M.P. It will be remembered how Sir Gerald, with the support of the Society, had introduced his own private member's Clean Air Bill in 1954, and had withdrawn it only when

the Government had agreed to introduce their own Bill before the end of the same session. Because of this initiative the Clean Air Act found its way to the statute book very much earlier than might have been the case.

In his speech Sir Gerald said that he was not full of eulogies as to the progress that had been achieved under the Clean Air Act, but it was modestly satisfactory. We were still the only nation in the world which had launched comprehensive, central government, clean air legislation. Those of us who remember those days would recall that they summarized Sir Hugh's magnificent Report by saying that there were five major contributors to air pollution in Britain. Those five were, first, low level domestic smoke; secondly, industrial smoke; thirdly, everything which today falls under the control of the Alkali Inspectorate; the fourth contributor was motor vehicle fumes; and the fifth was railway smoke.

It was interesting to look back at those five contributors and see what progress we thought had been made by each of them towards eliminating the evil. Sir Gerald thought that the marks out of 100 for their ten years of progress would be as follows. For low level domestic smoke, a 40-per cent elimination; 70 per cent elimination of the industrial smoke; a 30-per cent reduction for the "alkali" emissions; 10 per cent only for motor vehicle fumes, and progress up to 90 per cent for railway smoke.

Sir Gerald went on to say that he believed the other 60 per cent of pro-

gress required in the elimination of domestic smoke would be attained during the next decade. It depended on whether we could get enough smokeless-fuel in the right place at the right time.

The processes under the control of the Alkali Inspectorate were of course very difficult. There were some plants in the country where the only means of preventing the emissions of obnoxious fumes or grit from the chimneys, was to close down the plant. Chemical fertilizer plants, for example, might have the finest scrubbing equipment known to human ingenuity, but could not entirely eliminate the emission. And here Sir Gerald thought the fault was more due to the Government than to industry. Sir Hugh had written, very aptly, 11 years ago about the shortage of Alkali Inspectors. He was not suggesting there were none, but there were precious few. Local authority men in the room would know that he spoke the truth when he said that more often than not, an Alkali Inspector had to cover an area so huge that he could only visit individual plants within his jurisdiction, perhaps once a year. And he thought the first requirement was to try and attract more men into the Alkali Inspectorate, with a view to coaxing the defaulters in this field to endeavour to improve their plants.

On motor vehicles Sir Gerald said he had little to offer after what Robert Mellish had said at the lunch. He hoped he would not be thought guilty of an exaggeration when he said that so rapid had been the enlargement of the vehicle population of this country during the last ten years, with the huge consequential increase in the emission of carbon monoxide from exhausts, that he was not at all sure that all the beneficial effects of the clean air statute of ten years ago had not been entirely counterbalanced. The Government could not do much about it without the scientists and he believed that it would be a good investment for the Government—there was no element of party politics in this at all—to devote more of their research energy trying to find a practicable solution.

Sir Gerald concluded by wondering whether any amending legislation to the original statute was at present necessary. That must be a matter for the National Society for Clean Air and their advisers to consider. If they felt that amending legislation was necessary, it was of course a perfect subject for a private member's Bill. He was doomed to be a private member, for at least five years, and what better than a proposition on clean air should come this time from the opposition rather than from the Government side. He had been happy to work with Sir Hugh and with the Society, and he hoped they would use him in Parliament in the future and allow him to collaborate with them in this great adventure. This was an exercise which had not only social consequences of high order, but in his judgement as well had important economic consequences. They had all witnessed in the last ten years the great stride forward that had been made in every department of fuel technology, and in the improved methods of burning fuel of every kind. Much of this was due to the clean air legislation and he made no bones about the fact that originally he had introduced this legislation, not only with the inspiration of Sir Hugh Beaver and with the support of the Society, but largely because it was the only means, by statute, of causing people to burn fuel more easily. Sir Gerald concluded by thanking those present most warmly for having him as their guest, and said that if he could be of service to the Society in the future we should not hesitate to call upon him.

Dr. J. L. Burn

Next came Dr. J. L. Burn, Medical Officer of Health for Salford, former Chairman of the Society's Executive Council, and a member of The Beaver Committee.

He said the commemoration was best achieved not by back-slapping but by stimulus to further action in problems as yet unresolved.

He recalled the mountain pile of Reports before 1953 which had not

been implemented. The conclusions of the Beaver Committee were based on facts which had not been seriously challenged. But some critics had based their facts on their pre-conceived conclusions—hence the outcry in favour of sulphur dioxide as the principal enemy rather than smoke. All they knew at present still supported the Beaver report. It was easy to be wise after the event—the committee could not have foreseen the development of the use of North Sea gas, and so on. They had had to have one eye on the Treasury and the other on Parliamentary and public opinion. Hence the limit, which now seemed ludicrous, of £10 per conversion.

Black Areas Whiter

Much progress had been made. Observers from the northern heights of London could see St. Paul's frequently, whereas previously it had been visible in winter on a few days only. The black areas were coming whiter, and if they were not already "whiter than white" they were certainly whiter than some of the white areas. There was sometimes a sea of "smaze" in the valleys of non-industrial towns which would be intolerable in the so-called black areas.

The greatest fault attaching to the Clean Air Act was that it had not been fully implemented. Fortunately, the pioneer work of the Society, the Medical Research Council Units, the Warren Spring Laboratory in general, and the National Survey in particular, together with progressive action by enlightened industrialists, was having its effect. The cost to the nation of pollution, estimated by Beaver at £250 millions, would need revision. The health costs also in particular should be carefully worked out. The Act needed review on permitted periods, unsuitable fuel, odours, effluvia, coal-burning railway engines, and outmoded "defences". Perhaps Crown Premises should not only obey the general law but should observe more stringent standards as an example to all.

E. M. Birtwisle—Report on Revisions

In presenting a report of the Parliamentary and Local Government Committee, its Chairman, Mr. Birtwisle, first drew attention to a misconception of the position which might arise from what had been said by Sir Gerald Nabarro on the work of Alkali Inspectors. The bulk of the control of industrial emissions was the responsibility of local authorities and their officers and it was necessary that this continuing responsibility should be recognized. Great co-operation existed between the Alkali Inspectors and the local authority officers and he expressed the thanks of local authorities for the co-operation that was received in that way.

The examination of the Clean Air Act 1956, by his committee had led them to the conclusion that it was a very effective piece of legislation and in general terms did not require major amendment. What was vitally necessary was a deeper recognition by local authorities of the obligations the Act placed upon them and only if all the provisions of the Act were fully implemented would the dream of a pollution-free country emerge.

The section in the Act which perhaps needed greatest amendment was that dealing with the control of heights of chimneys, a very essential safeguard in order to limit ground level concentrations of sulphur dioxide. This was, in fact, the only safeguard against this pollution at present available and yet the section was so worded that it could only be applied in the minority of cases. Many new buildings now being erected were exempted from the need to submit building plans to local authorities and so escaped completely, but in cases where the local authority had the opportunity of fixing a chimney height when approving the plan there was no guarantee as to the installation being completed on the basis of the information shown on the plan, and often the careful calculation of chimney height was nullified by changes in size of plant or fuel used. It was obvious, too, that better control was needed for

existing plants and in the case of all premises with sizeable furnaces, whether domestic, commercial, or industrial, the opportunity of fixing heights of chimneys should be available where new plant was installed or there was a change in the type of fuel burnt.

The next important revision touched on the control of the installation of fireplaces in new buildings, which purported to be controlled by a building regulation with a sub-heading "Prevention of emission of smoke", but when this regulation was examined it gave very little opportunity for requiring the installation of a modern, efficient grate. The committee were surprised that the solid fuel industry had not shown themselves anxious to be free of this image of the inefficient, dirty grate, and perhaps they might join with the Society in pressing for a much more suitable regulation. The attitude of the Ministry of Public Building and Works on this matter was not at all in line with the attitude of the Ministry of Housing and Local Government, and the Treasury, in making money so freely available to take out the type of appliance allowed by the regulations where it is found in existing buildings.

Smoke nuisances called for much greater control than was available under Section 16. The exemption of dwellinghouse chimneys should be removed and control of industrial and commercial bonfires provided for on the basis of power obtained recently in local private acts. It might also be advisable for local authorities, well advanced in smoke control area work, to be given power to make a local regulation prohibiting any type of bonfire.

The work of making smoke control areas should be a statutory duty of local authorities, continued Mr. Birtwisle. The Minister had no doubt considered how this could be done before sending out his recent circular and early amendments to this end would be welcome. Power of entry to dwelling-houses in smoke control areas where smoke was being emitted from a

chimney was particularly important, as was the opportunity of sampling the fuel being used or stored on the premises.

Advance Grants

In most parts of the country there was a continuing demand for local authorities to be given the opportunity of making grants in advance of the declaration of smoke control areas. Resistance to such a concession seemed to have arisen from the inability of a local authority to guarantee the use of a smokeless fuel on the appliances on which such grants could be made, but with the wider use of gas and electricity in smoke control areas it was felt that a large proportion of the conversions would be to appliances which could not be used otherwise than smokelessly. The opportunity to give these grants would enable householders to carry out conversions at a time suitable to themselves, such as when other improvements are being done or major decorations effected. It seems illogical to go to all the work involved in a smoke control area and still not be able to prevent people selling or purchasing coal, which if burnt in the house was almost bound to result in smoke being emitted. The time had long passed when local authorities should have had the power to ban effectively the sale or purchase of coal in smoke control areas except where it could be proved that appliances could consume it smokelessly. Talking of coal brings them to the question of definitions of fuel, particularly authorized fuel, such as low volatile steam coals. This class of material and the manufactured solid smokeless fuels should be defined in accordance with precise standards. Many cases came to light of persons producing smoke in smoke control areas because they were unaware that they had bought or taken the tenancy of a house which was subject to an order. The rent book might well be used as a means of informing tenants and the landlord required to enter suitable information on the rent book. Owner-occupiers might be guided by a re-

quirement that on the sale of premises the vendor should disclose as to whether or not a Smoke Control Order affected the property.

Dark Smoke Defences

The defences provided in Section 1 with regard to a plea that smoke emission was due to the breakdown of plant or the delivery of unsuitable fuel should only be capable of being used where an owner had declared his difficulty to the enforcing authority. Indeed, it would appear to be useful if the section were amended to provide that where any such breakdown occurred or any delivery of unsuitable fuel was made, immediate notification should be given to the Public Health Inspector so that he would be in a position to know of these facts. An amendment was also needed to eliminate the need for proof of the use of the Ringelmann chart when prosecuting for the emission of black smoke. The proviso covering dark smoke should

be extended to cover black too. Finally, there would seem to be a case for a local authority having the power, where circumstances rendered it necessary, to ban the use of high sulphur fuels. It was not envisaged that this power would be widely used but circumstances were known to arise where high concentration of buildings and architectural considerations of heights of chimney indicated the need for using forms of fuel which have low sulphur content, even though looked at as a heating exercise it might be uneconomic.

These then were the points now being considered by the committee for a recommendation to the Executive Council before submission to the Ministry of Housing and Local Government. The opportunity was taken of presenting this information at this stage so that members of the Society present at the meeting might express their views and also add other matters which they thought should be taken into consideration.

Conference in Dundee

Scottish Division's May Meeting

Report from James Goodfellow

THE Conference of the Scottish Division of the National Society for Clean Air took place in Dundee from 18 to 20 May, 1966. It began with the Annual General Meeting which was held in the Royal Hotel, Union Street, Dundee. Mr. John Foreman, who has been Vice-President for the past three years, took the chair in the absence of Councillor William Monteith. A vote of thanks was passed unanimously to Councillor Monteith in appreciation of his long and great services to the Scottish Division and he was made Honorary Vice-President.

A projector was presented to Mr. T. M. Ashford, M.B.E., A.M.I.MECH.E., A.M.I.F.E. in recognition of his 37 years as lecturer to Firemen's Classes; the presentation was made by Mrs. E. M. Hanney of the Electrical Association for women on behalf of the Scottish Division.

A new constitution for the Scottish Division was submitted and approved.

Then followed a social evening for all delegates; this took the shape of an informal reception which later included a showing of the films "Clean Air", "One Mile Up" and "It takes

your breath away”.

The Conference Sessions, which were held in the Marryat Hall, City Square, began at 10.30 a.m. on Thursday, 19 May. The Lord Provost of Dundee was represented by Councillor Mrs. J. B. Saggat, Convener, Health and Welfare Committee, who welcomed the delegates to Dundee.

The forenoon session under the chairmanship of Mr. John Foreman was treated to three inspiring addresses. The opening address on “Clean Air—Prospects for the Future” was given by Lord Hughes, C.B.E., D.L., J.P., LL.D., Joint Parliamentary Under-Secretary of State, Scottish Office. Lord Hughes said that 18,000 houses in Dundee were already under smoke control, this was approximately 30 per cent of the City’s houses. He said that he was occasionally shocked by still hearing councillors of otherwise progressive authorities, who were indifferent to the damaging smoke pollution of air; when those same councillors would fight vigorously against any innocuous water contamination. He said progress in clean air in the first ten years had been fair, but it had been uneven. Progress for the future must be speeded up to completion, for a stage would be reached when it would be applauded by all; for nothing would pay such dividends to the nation as clean air. Lord Hughes gave a warning that the Government would seek compulsory powers against towns refusing to introduce smoke control. He said that 26 of the 52 Scottish burghs had not replied to letters from the Scottish Secretary urging them to make a start with smoke control, and 14 burghs had replied that they would not introduce smoke control.

Lord Hughes stated “We will not let the matter rest there. But we will only seek compulsory powers when it is obvious that every endeavour to proceed has failed.”

Nuclear Generation

An address on “Nuclear Generation” was given by Mr. J. N. Tweedy, B.Sc., F.INST.P., A.M.I.E.E., Nuclear

Operation’s Engineer, South of Scotland Electricity Board. Mr. Tweedy stressed the need for additional supplies of power, and the important contribution that could be made by nuclear generation, and he stated that Scotland led the world in having the highest proportion of nuclear power at 22 per cent. He explained the safeguards that would ensure that nuclear plants were always operated under conditions of absolute safety, and stressed that nuclear generators were clean air plants.

Mr. W. C. Hopper of the Technical Development Division of British Petroleum Co. Ltd., spoke on “North Sea Gas” and said that the first gas strike of North Sea Gas had enabled an agreement to be made with the Gas Council for the delivery of 50 million cubic feet of gas per day. He stressed that this gas was largely methane and therefore non-toxic and with high calorific value. He said this gas was a clean air fuel that would be able to make a big contribution in the domestic field and for small commercial users. The quantity of gas so far found was only a drop in the increasing ocean of demand for fuel in this country, which would maintain demand for all fuels.

The afternoon session under the chairmanship of Mr. John Innes, former President of the Scottish Division, was first addressed by Mr. R. R. A. Pride, B.Sc., F.R.I.C., District Alkali Inspector, Scottish Development Department, who illustrated with coloured slides many of the industrial processes causing air pollution problems, and claimed that industry had spent a very great deal of money on clean air. Then Mr. Ian MacPherson, B.Sc., M.R.S.H., Technical Officer, Smoke Control Areas, Health and Welfare Department, Glasgow, gave an address on “Glasgow’s Approach to Domestic Smoke Control”. He stated that by September 1967 18,589 acres of the city and 137,368 premises would be under smoke control. He emphasized the

—Concluded on page 247

£1m. ICED "EARTH TANKS"

Holes in Ground will Store Deep Freeze Gas

A novel method of using iced "earth tanks" for storing liquid natural gas to help meet seasonal and sudden peak load requirements, is planned for Canvey Island, Essex. Two frozen ground storage units, the first of their kind in Europe, will be constructed on the Island at the reception terminal for Algerian natural gas. One of these units could contain enough gas to supply all the country for one day.

The North Thames Gas Board, acting as agent for the Gas Council, has awarded a contract to Sir Robert McAlpine & Sons Ltd., to construct these two units under a licence from Conch International Methane Ltd., who developed this exciting new technique.

Each unit will hold some 21,000 tons of liquid natural gas, equivalent to about 11 million therms, and their combined capacity would be sufficient to fill the Royal Albert Hall with this liquid gas.

The Gas Council has approved in principle the construction of a second pair of units of similar size. The total cost for the four units would be in the neighbourhood of £4 million. The first two units, each 130 feet in diameter and 130 feet deep, are scheduled for completion in August and November next year.

Between them, the four units will be capable of storing the equivalent of 4,000 million cubic feet of gas. Both in capital costs and in the amount of ground required, this new storage system can be substantially more economic than the use of above-ground tanks.

Conch's technique of storing liquid natural gas in the ground has already been used successfully near New York and in Arzew, Algeria. It is the intense cold of the liquid which makes possible this form of storage.

The Principle

In essence, the method consists of pre-freezing an earthen cylinder to the required depth, excavating the unfrozen earth from inside and covering the cavity with a gas-tight roof suitably insulated. The ice barrier formed in the "earth tank" prevents the liquid from leaking and also acts as an insulating material. Pipes are installed through the roof for filling and withdrawal of liquid and also for removal of the "boil-off" gas. The "earth tank" is kept absolutely hard and rigid by the liquid gas which is at a temperature of minus 161°C. (minus 258°F.).

At the present time, about 700,000 tons of Algerian liquefied natural gas a year (equivalent to some 365 million therms of gas) are being delivered to the terminal at Canvey Island. The amount of liquid gas stored in above-ground tanks—22,000 tons—is sufficient to satisfy the variations in demand between weekdays and weekends.

The main advantage of the new system of storage is that it can be designed either to supply very large quantities of gas for short periods or to even out the longer term seasonal variations. The Canvey installation containing 84,000 tons of liquid natural gas will be able to supply an extra 100 million cubic feet of natural gas a day into the pipeline and will *double* the present send-out capacity of the Algerian natural gas scheme for a period up to 40 days.

The importance of this new storage scheme is in relation to North Sea gas (which needs to be withdrawn at a fairly uniform rate throughout the year because of the relatively high capital cost involved). Plans are now being considered which would make use of the *extreme flexibility* of frozen ground storage to reinforce the supply of North Sea gas at times when there is an extra heavy demand on the pipeline

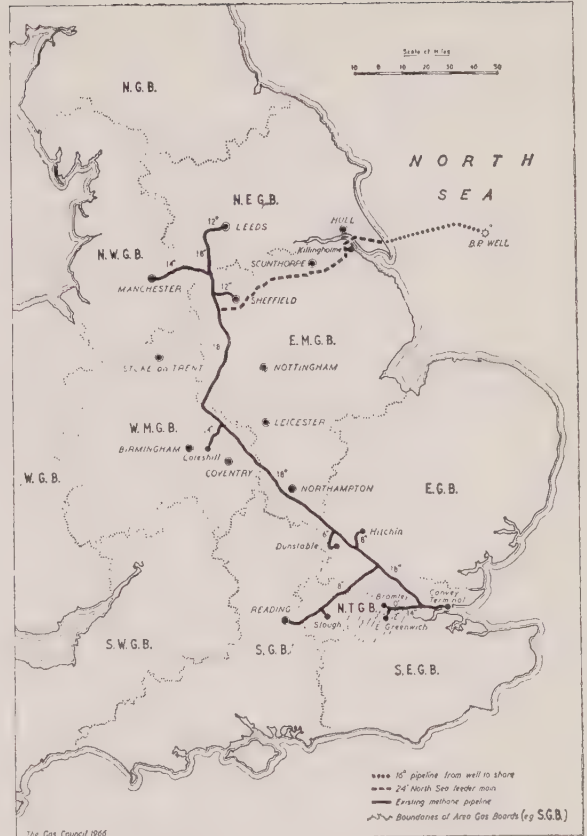
system due to sudden variations of temperature. This particular situation is well accommodated by frozen ground storage which permits a much more rapid rate of withdrawal than would be economic in the case of underground storage in water-bearing rock layers (aquifers).

NORTH SEA GAS PLANS

New pipelines to carry North Sea and other natural gas throughout Great Britain were announced by Sir Henry Jones, K.B.E., Chairman of the Gas Council, in London recently.

In his address to the Fourth International Pipes, Pipelines and Pumps Convention, Sir Henry, who is Chairman of the Convention Committee, said: "Now that gas is being discovered in the North Sea, the pipeline system installed in Britain for Algerian gas is assuming even greater importance. It is designed around an 18-inch 'backbone' from Canvey Island, Essex, to Yorkshire, passing close to the conurbation around Birmingham and to the steel town of Sheffield.

"This 18-inch trunk line will be linked to the undersea pipelines bringing gas from the North Sea and possibly from or to the Continent. It may in time also be linked to additional ports for the reception of additional liquid natural gas and, in any case, the Canvey Island Terminal



How the gas from the B.P. well will be connected with the present grid from Canvey Island. (More recent gas discoveries may have already made this map out-of-date)

has been designed for such expansion."

Sir Henry said that from now, all pipelines laid by the British Gas Industry, including that between the East and West Midlands Boards, will be designed to natural gas standards.

Dundee Conference—concluded

importance to local authorities, of keeping up the steady making of smoke control areas, so as to enable contractors carrying out adaptations to have continuity of employment.

The forenoon session on Friday, 20 May heard addresses on fuel availability and appliances. Mr. R. S. Goddard, A.M.I.E.E., Commercial Officer, Dundee Area, North of Scotland Hydro-Electric Board, spoke for electricity. Mr. A. A. Dove, Controller of Sales and Marketing, Scottish Gas Board spoke for gas. Mr. J. S. Murray,

Technical Services Department Domestic Markets Division, Shell and B.P. Scotland Ltd., spoke for oil.

Mr. W. C. Moss, Technical Manager, Coal Utilization Council, spoke for solid fuel. There was considerable discussion on the house heating of the future. It was agreed that the day was long gone when the front room was unheated, and was kept for the corpse or the courting couple, because neither of those uses needed any external heat. It was agreed that householders wanted cheap heat from easily controlled appliances of pleasing appearance, and modern design.

The October Congress

More Information



The final notice and invitation for the Congress has now been distributed on a wide scale both in this country and overseas and registrations are starting to come in at a satisfactory rate. (Any reader who has not seen a copy of the invitation will be sent one on request.)

There is not a great deal to add, at the moment, to the information already published, except in respect of social functions. On the Monday evening (3 October) there will be a Government reception for overseas delegates, and later during the same evening an informal eve-of-conference party at the Savoy Hotel for up to 1,000 delegates, at the joint invitation of the Gas Council and the Electricity Council. Next, on the Tuesday evening there will be a dinner at the Café Royal for up to 500 delegates and their ladies, at the invitation of the National Coal Board.

On the Wednesday evening, as previously announced, there will be a Congress Dinner, with dancing and cabaret, at the Connaught Rooms (tickets £2 10s. each) and on the Thursday evening there will be a reception by the Lord Mayor of London at the Guildhall, for which the number of invitations may have to be limited.

The Visits

In addition to tours and visits of a more social and sightseeing nature for delegates' ladies, an extensive list of technical and clean air interest visits is being organized for the Friday. The list is subject to modification at this stage, and confirmation with full details of the arrangements will be given in a notice with reply form that will be sent in due course to all dele-

gates. Participation in these visits will of course be restricted to registered delegates. The provisional list is as follows:

Esso refinery, Fawley; NCB Multi-heat plant, Cardiff; Richard Thomas and Baldwin, Spencer Works, Newport; BCURA, Leatherhead; Warren Spring Laboratory, Stevenage; Air Pollution Research Unit, Medical Research Council; BP Research Laboratory, Sunbury-on-Thames; Shell Research Station, Egham; Methane Terminal and Hydrocarbon gasification plant, Canvey Island; Bradwell Nuclear Power Station; CEGB Research Laboratory, Leatherhead; Marchwood Power Station and Laboratory, Hampshire; and (subject to satisfactory transport arrangements) Billingham Group Heating scheme.

THE PAPERS

Following is a list of the Papers that have been accepted for presentation at the Congress. The list is provisional in that a few of the papers included may be cancelled and there may be a few additions. The list is a long one, and for brevity the names of the authors have been shortened to surname and initials only.

Session II (4 October, a.m.)

Continental Reports

ISAAC, P. C. G. *U.K. Africa.*

HUGUET, J. S. *U.S.A. North America.*

RISPOLI, J. A. *Argentina South and Central America.*

TAGA, T. *Japan Asia.*

SULLIVAN, J. L. *New South Wales Australia and New Zealand.*

STEPHANY, H. *(West Germany) and*

ROUSSEL, A. *(France) Europe.*

Session III (4 October, p.m.)**Domestic, Space Heating, Town Planning, etc.**

BIERSTEKER, K. and **de GRAAF, H.** *Netherlands* Domestic indoor pollution and air pollution epidemiology in Rotterdam.

BÖER, W. *German Democratic Republic* The application of meteorological data to town planning in respect of air pollution problems.

STREET, J. H. *U.K.* The control of smoke emission from domestic sources.

BUCK, M. *West Germany* Measurement of sulphur dioxide and dust within the air monitoring programme of North Rhine Westphalia.

GARNETT, A. *U.K.* A geographical approach to the study of air pollution and air pollution survey.

GILLS, B. and **HOWE, E. L.** *U.K.* Oil burners for domestic application: present designs recent improvements, future developments.

HALLIDAY, E. C. and **LATSKY, C. E.** *South Africa* Report on progress in air pollution control in South Africa.

HORN, K. *German Democratic Republic* Air pollution situation and problems in the GDR.

LAAMANEN, A. and **NORO, L.** *Finland* Air pollution and special problems in Finland.

LAROCHE *France* Special fuels: the part played by Charbonnages de France in the fight against air pollution.

LARSEN, R. I. *U.S.A.* Determining source reduction needed to meet air quality standards.

MAHLER, E. A. J. *U.K.* Standards of emission under the Alkali Act.

MOLSKI, B. A. *Nigeria* The importance of tree belts as a protection against the Harmattan in Nigeria.

ROBB, F. F. *U.K.* The role of gas in the reduction of air pollution.

IVERSEN, N. S. *Denmark* What district heating with incineration has meant to a typical Danish town from an air pollution point of view.

Session IV (5 October, a.m.)**Industrial Problems: General**

CLEARY, G. J. M. *Australia* The use of ratios of polycyclic aromatic hydrocarbons to follow the sequence of combustion in a hand-fired intermittent brick kiln.

DEBRUN *France* The fight against air pollution in power stations.

DICKIE, W. J. *U.K.* Some industrial

problems arising from the Clean Air Act, 1956.

HENDRICKSON, E. R. and **LAGARIAS, J. S.** *U.S.A.* Control of air pollution from phosphate processing.

HENDRICKSON, E. R. and **HARDING, C. I.** *U.S.A.* Air pollution problems associated with phosphate processing.

HOLL *France* Control of atmospheric pollution in sites of power stations in 1964 and 1965.

JACKSON, N. H. *U.K.* Fume emissions from the melting of copper and its alloys.

KOHLER, W. *West Germany* Methods for the abatement of air pollution caused by cement plants.

KOVACH, J. L. *U.S.A.* Air pollution control by absorption on activated charcoal.

FRANKENBERG, T. T. and **SPORN, P.** *U.S.A.* Pioneering experience with high stacks on the Ohio Valley Electricity Corporation, and the American Electric Power System.

LOSZEK, W. *Poland* The problems of the maintenance of clean air in a zone polluted by waste gases from metallurgical works.

SMOLIK, J. *Czechoslovakia* Analysis of parallel cyclone operation.

TERMEULEN, M. A. *West Europe* Air pollution control by oil refineries.

Session V (5 October, p.m.)**Industrial Problems: Grit and Dust**

CEDERHOLM, C. *Sweden* Collection of dust from refuse incinerators in electro-filters provided with multicyclone after-collectors.

COOPER, R. L. and **LEE, G. W.** *U.K.* Alleviation of air pollution in the coking industry.

EYRAUD, C. *France* Study of the efficiency of a dust collector.

CHAMBERLIN, R. L. and **MOODIE, G.** *U.S.A. and U.K.* What Price Industrial Air Cleaning?

KITROEFF, P. *U.K.* Dust control by filtration at high temperatures and potentially corrosive conditions.

MAARTMAN, S. *Sweden* Collection of dust from oil-fired boilers and electro-filters.

TOMAIDES, M. and **STORCH, O.** *Czechoslovakia* Experiences in the application of wet dust collectors in the iron and steel industry.

TOMAIDES, M. and **STORCH, O.** *Czechoslovakia* Dust collection in the cement industry.

SCHWARZ, K. *West Germany* Dust emission from modern coal-fired large-scale boiler plants in the Federal Republic of Germany.

SULLIVAN, J. L. *Australia* The control of fume from a hot blast cupola by high energy scrubbing without appreciable thermal buoyancy loss.

SUSSMAN, V. H. *U.S.A.* A unique regulation for the control of particulate matter emissions.

SCHNEIDER, G. G. *U.S.A.* International experience in dust and fume control problems.

Session VI (6 October, a.m.)

Fumes and Gases

ARCHER, A. *U.K.* Clean air and the iron-foundry.

CHAPOUX, E. and **DELPEYROUX, J.** *France* French studies on vehicle exhaust pollution.

BOSSAVY, J. *France* Effects of gaseous fluorides on species of forests.

BOURBON, P. *France* Contribution to the study of analytical problems of fluoride dosage realized during the course of various investigations in the South West.

SINGERMAN, A. *Argentina* Polycyclic aromatic hydrocarbons and arsenic in the atmosphere of Buenos Aires City.

DE CORMIS, L. *France* Comparative effects of SO₂ and flourous derivatives on certain types of vegetation.

CHOVIN, P. and **THIEBAULT, R.** *France* First remedies used in Paris against air pollution from motor vehicle exhaust gases.

CLARKE, A. J., SPURR, G. and **CATCHPOLE, S.** *U.K.* Power station chimney emissions; review of progress over the past ten years.

FIRST, M. W. *U.S.A.* Control of haze odours from the curing of plastics.

GILLHAM, E. W. F., MARTIN, A. and **BARBER, F. R.** *U.K.* Sulphur dioxide concentrations measured around a modern power station.

GRANT, E. P. *U.S.A.* The control of motor vehicle emission in California.

GEORGII, H. W. *West Germany* On the vertical distribution of carbon monoxide in urban streets.

OELS, F. *West Germany* Pilot plants for desulphurization of flue gases in North Rhine Westphalia.

IRENS, A. N. *U.K.* Tomorrow's town transport—the advantage of electric traction.

FEIST, H. J. *U.K.* The removal of

nitrogen oxide fumes with catalytic combustion.

HUNIGEN, E., SACHSE, J. and **JASKULLA, N.** *German Democratic Republic* The efficient method and type of device for measuring, and a proposal for internationally acceptable limits of diesel smoke.

HUNIGEN, E., SACHSE, J. and **JASKULLA, N.** *German Democratic Republic* The reduction of carcinogenic contaminants in the exhaust gases of petrol engines by fuel additives and choice of lubricants.

KOTHNY, E. L. and **MUELLER, P. K.** *U.S.A.* Concentration and size distribution of lead-containing particles in motor vehicle exhausts.

GOLOTHAN, D. W. *U.K.* The control of diesel engine exhaust smoke.

PEGG, R. E., FULLER, H. I. and **RAMSDEN, A. W.** *U.K.* Towards cleaner diesel engine exhausts.

Session VII (6 October, p.m.)

Investigations and Research

VADOT *France* Study of diffusion in hydraulic similarity.

DETRIE, J. P. *France* Statistical studies in the Seine district and in Paris of emissions and attempts at correlation with the meteorological data and measurements in the environment.

TRAVNICEK, Z. *Czechoslovakia* Effects of air pollution on textiles, especially synthetic fibres.

TOMITA, K. and **WATANABE, H.** *Japan* Carcinogenic hydrocarbons in the atmosphere of Osaka.

KANNO, S. and **FUKUI, S.** *Japan* Problems of the absorption mixture in the determination of hydrogen sulphide in the atmosphere.

SUZUKI, S. *Japan* Studies on automatic recording type apparatus for the measurement of oxidants in air pollution.

BREUER, W. and **WINKLER, K.** *West Germany* Sources and distribution of air pollution ascertained by stationary registration of its components.

GRÄFE, K. *West Germany* Comparison between calculated and continuously measured SO₂ contents with regard to the determination of stack heights.

ROSS, C. R. and **WILSON, H. J.** *Canada* Air pollution monitoring in Canada.

LUTHER, H. and **BERGMANN, G.** *West Germany* Measurements for establishing a driving cycle of passenger cars in large cities.

SANTOMAURO, L. *Italy* Effects of meteorological factors on stack effluents.

BRAVO, A. H. and VIVIEGRA, G. O. *Mexico* Sulphur dioxide horizontal concentration in Mexico City.

JOOSTING, P. E. *The Netherlands* Evaluation of zero levels of effect on the basis of various epidemiological data.

WASSERMANN, M. *Israel* Normal values of toxic substances in the human body and their significance for air pollution valuation.

CARNE, S. *U.K.* Study of the effect of air pollution upon respiratory disease in London and Sheffield in the winters of 1962-3 and 1963-4.

COMMINS, B. T. and WALLER, R. E. *U.K.* Episodes of high pollution in London, 1952-6.

BRANT, J. W. A. and LOVE, K. J. *U.S.A.* Infant respiratory diseases and atmospheric air pollution in Los Angeles, California.

BROCKHAUS, A. and FRIEDRICH, K. H. *West Germany* Measurement of particulate atmospheric pollutants in the Ruhr district.

CRAXFORD, S. R., CLIFTON, M. and WEATHERLEY, M.-L. P. M. *U.K.* Smoke and sulphur dioxide in Great Britain—distribution and changes.

FRANGIPANE, F. *Italy* Recent research by the Institute on air pollution in Milan.

DIAMANT, W. *France* Optical investigations into research on air pollution.

HENDRICKSON, E. R., KUPCHIK, G. and THOMAS, M. *U.S.A.* Development of a manual of methods for air sampling and analysis.

Session VIII (6 October, p.m.)

Organization, Administration and International Co-operation

BERG, J. *West Germany* Governmental responsibility in the field of air pollution.

OELS, H. *West Germany* Technical regulations for air pollution control in the Federal Republic of Germany.

ASSOCIATION OF PUBLIC HEALTH INSPECTORS U.K. The administration of clean air legislation in the United Kingdom.

McCABE, L., LAGARIAS, J. S. and MAPSTON, R. T. *U.S.A.* The operation of the technical committees of the Air Pollution Control Association, U.S.A.

DREYHAUPT, F. J. *West Germany* Organization and operation of the administrative authorities with regard to planning and enforcing clean air measures.

GALL, D. *Europe* An account of the air pollution working party of the European Federation of Chemical Engineering.

STANLEY, W. J. *U.S.A.* Air resource management in the Chicago metropolitan area.

ADINOLFI, G. *Europe* Progress report on the results of the 1964 Conference of the Council of Europe at Strasbourg.

LAMEYRE *France* Practical measures taken in the fight against air pollution in Paris.

PAVANELLO, R. and GOLDSMITH, J. *World Health Organization* The air pollution programme of the World Health Organization.

SEIDL, W. *West Germany* International co-operation in documentation and terminology in the field of air pollution.

Heating and Air Conditioning Controls

Satchwell, one of the best-known names in the heating industry, has developed a completely new range of modern compact, low-cost and easy-to-install transistorized heating and air-conditioning controls, which incorporates novel design features based upon the Company's many years of experience of the British and Overseas markets.

The new range has been developed by Satchwell Control Systems Limited, a member of the Elliott-Automation Group. It not only combines the advantages of greatly increased reliability, through the use of printed circuits, transistors and dry-reed relays, reduced size and ease of installation, but also achieves these objects at two-thirds of the price of

the equipment it replaces. Preliminary market surveys have demonstrated that large export orders can be expected as a result of these outstanding design features in addition to a substantially increased home demand for this type of equipment.

The two basic controllers in the range, the "Compensator 7" and the new "Monotronic" will in due course replace respectively the well-known Satchwell "Compensator 4" and "Monotronic" controllers introduced a number of years ago. Both employ in their systems a new miniature Satchwell mixing valve, the "Mixival", developed from the highly successful Satchwell "Minival" introduced in 1965.

For further information apply to Satchwell Control Systems Limited, Farnham Road, Slough, Bucks.

INTERNATIONAL SECTION

U.S.A.

THE QUALITY OF OUR ENVIRONMENT

A White House Report

The unwanted consequences of the kind of civilization we have created, and which we are continually making more intractable, are nowhere found more vividly than in the United States, where growth of every kind, wanted and unwanted, has been fastest and most intense. Among the many problems that have arisen one of the most serious is the degradation by man of his environment: a degradation that follows swiftly on the heels of material prosperity and the ceaseless striving of what is regarded as the good life.

Fortunately for themselves—and for others—this problem is being recognized by the Americans at the highest levels, and it is a sign of the anxiety that is being felt that the President himself has taken the lead in calling together groups of leading authorities to study and make recommendations.

A first result of this action is a recently published report of the Environmental Pollution Panel of the President's Science Advisory Committee, published simply by "The White House", and with the title *Restoring the Quality of our Environment*.

What is implied is given by the definition that introduces the report:

"Environmental pollution is the unfavourable alteration of our surroundings, wholly or largely as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and

physical constitution and abundances of organisms. These changes may affect man directly, or through his supplies of water and of agricultural and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature."

One of the most interesting features of the report is that it deals with the environment as a whole, taking in pollution in all its forms. Affecting the environment is the pollution of the air, the pollution of water, pollution of the soil, and even what is considered as visual pollution is given attention. Noise, though, which also degrades the environment, is only briefly mentioned.

The effects and sources of pollution are succinctly reviewed in just a few pages, which are followed by 23 pages of recommendations, and then 250 pages of appendices which include the reports of eleven sub-panels. The volume is, in short, well-ordered, systematic, and to the point throughout.

The Recommendations

The recommendations are numerous and detailed, calling for much new organization of effort, more expenditure, more manpower, and much sustained determination. Pesticide control, sewage problems, the safeguarding of solid and water resources, and biological problems, make up a large proportion of the recommendations,

with air pollution control specifically the concern of only a few. From these the following may be quoted:

We recommend that careful study be given to tax-like systems in which all polluters would be subject to "effluent charges" in proportion to their contribution to pollution.

We recommend that the principle of requiring registration before use should be extended to the addition to motor fuels of substances which are not eliminated by the combustion process.

We recommend that the Department of Housing and Urban Development direct a substantial proportion of its support for community facilities to assisting cities to use present technology to clean up such obviously critical solid waste practices as open dump burning and unsanitary land fill.

We recommend that the Federal Government, working in co-operation with the states, encourage the formation of compacts and unified authorities to deal with air pollution within natural airsheds.

We recommend that the Environmental Sciences Service Administration and its collaborators continue, for at least the next several decades, their series of precise measurements of the CO₂ content of the atmosphere.

We recommend that the Federal Government exert every effort to stimulate industry to develop and demonstrate means of powering automobiles and trucks that will not produce noxious effluents.

We recommend that the Federal Government stimulate industrial development of more economic processes for exclusion of sulphur compounds from stack effluents.

We have quoted the bare recommendations and not the annotation that accompanies them. And we have refrained from quoting recommendations on matters of considerable general, but not air pollution, interest. With the following exception, which touches on a problem that is growing fast in our own country, too:

We recommend stimulation by the Federal Government for development of

container materials which have adequate storage life, but which will degrade rapidly when discarded.

Carbon Dioxide

The reference to the carbon dioxide content of the atmosphere quoted above is followed up by a detailed and lengthy appendix, entitled "Carbon Dioxide from Fossil Fuels—the Invisible Pollutant". This gas, the product of complete combustion, and exhaled continuously in our own breath, is not usually regarded as a pollutant. And yet, in the long run, it may be the most serious pollutant of all. As this survey puts it in its conclusions:

"Through his worldwide industrial civilization, Man is unwittingly conducting a vast geophysical experiment. Within a few generations he is burning the fossil fuels that slowly accumulated in the earth over the past 500 million years. The CO₂ produced by this combustion is being injected into the atmosphere: about half of it remains there. The estimated recoverable reserves of fossil fuels are sufficient to produce nearly a 200-per cent increase in the carbon dioxide content of the atmosphere.

"By the year 2000 the increase in atmospheric CO₂ will be close to 25 per cent. This may be sufficient to produce measurable and perhaps marked changes in climate, and will almost certainly cause significant changes in the temperature and other properties of the stratosphere. At present it is impossible to predict these effects quantitatively, but recent advances in mathematical modelling of the atmosphere, using large computers, may allow useful predictions within the next two or three years."

It is the effect upon climate that may be so serious. Part of the added carbon dioxide will become dissolved in the ocean, and part will be taken up by the biosphere, chiefly in trees and other terrestrial plants, and in the dead plant litter called humus. The part that remains in the atmosphere may have a significant effect on climate: carbon dioxide is nearly transparent to visible

light, but it is a strong absorber and back radiator of infrared radiation, particularly in the wave lengths from 12 to 18 microns; consequently, an increase of atmospheric carbon dioxide could act, much like the glass in a greenhouse, to raise the temperature of the lower air.

The principal possible effect of increased CO₂ would be to affect the world's climate by increased temperature and increased water vapour content. There is some evidence that the warming of the atmosphere over the last century has been due to the 10 per cent increase in CO₂ during the period 1850 to 1940. But calculations and predictions are complex, and other factors come into the picture, and it will be a few years yet before more accurate forecasts can be made. The possible melting of the Antarctic ice-cap would raise the sea level by 400 feet, but at worst this would take anything from 400 to 4,000 years.

(This report is commented upon in an editorial note on page 231—Ed.)

AIR CONSERVATION

Air Conservation. Report of the Air Conservation Commission of the American Association for the Advancement of Science. Pp. 335. Published by the A.A.A.S., Washington, and in Britain by Bailey Bros. and Swinfen, London, at 80s. net.

This volume was received after the review above on *The Quality of our Environment* had been written, or the two might have been noticed together. In that review the integration of air pollution with other enemies of the environment was noted, but this A.A.A.S. report deals solely with air pollution or, as it prefers to put it, with air conservation. As far as we know there was no link-up between the commission which produced it and the Environmental Pollution Panel of the President's Science Advisory Committee. It suggests there may be some duplication of effort in this field of study.

The A.A.A.S. report—which incidentally is a handsomely produced and well printed hardback volume—stresses that “throughout its deliberations the Commission has been concerned not only with the problems of *air pollution*, but also with the need for *air conservation*. The Commission has been impressed with the need not only to control pollution, but also to develop programmes to conserve the air”.

As there appears to be little danger of the air disappearing we assume that this statement means that in addition to “controlling” the pollution that exists, efforts should be made to keep clean air clean. The use of the word “conservation” in the name of the Commission, and in the title and throughout the report, is indeed rather puzzling.

The plan of the report is very similar to the Environment report already referred to—there are some 20 pages of discussion on the philosophy of the study, the assumptions on which it is based, and the recommendations that are its outcome, under the heading of “Conservation and Public Policy”. Then there is a section of similar length entitled “A Summary of the Facts”; and finally there is Part 3, a series of “Background Reports”, which take up the final plus 250 pages.

This arrangement provides, in the summary section, an excellent outline of the problem in a concise and clearly written form, while the third part is a most useful source of more detailed information and of references. The report in fact, is more like a new text book on air pollution than the outcome of the deliberations of a twelve-man commission—and that is intended as a complimentary comment.

In short, the factual contents of the report are excellent, even though they may include little that is new. It is in the “assumptions” and the recommendations that one finds—and this applies also to the Environment report—a need to philosophize and moralize about the problem and to search for definitions and statements of purposes, all of which seems to produce a certain

vagueness and wooliness. Or perhaps it is just our British pragmatism that makes it seem that way.

NATIONAL CONFERENCE PLANNED

The Secretary of Health, Education, and Welfare, John W. Gardner, has announced that a National Conference on Air Pollution will be held in Washington D.C. on 12 to 14 December next.

At the Conference, representatives of business, labour, civic organizations, and all levels of government will be called upon to examine the current status of air pollution control and to make recommendations for the improvement and acceleration of control efforts throughout the country.

Conference planning will be conducted by the Public Health Service's Division of Air Pollution. Mr. Vernon G. MacKenzie, Assistant Surgeon General and Chief of the Division of Air Pollution of the Public Health Service, has appointed an Assistant Division Chief, Mr. Arthur C. Stern, as Executive Secretary for the 1966 Conference.

The last National Conference on Air Pollution, held in 1962 at the Sheraton Park Hotel in Washington, D.C., was attended by 1,500 participants. The 1966 Conference, to be held on the same site, is expected to attract an even larger attendance.

San Francisco Conference

The Air Pollution Control Association of America held its 59th annual congress in San Francisco on 20-24 June. An attendance of over 1,000 was anticipated. We hope to give a report in our next issue.

Sulphur Dioxide Research

Bituminous Coal Research Inc. has been assigned primary responsibility for a study of sulphur dioxide control processes under an expanded air pollution research programme announced by the bituminous coal and

electric utility industries. The National Coal Association, with which BCR is affiliated, and the Electric Research Council, representing the total electric utility industry and supported by the Edison Electric Institute, said the programme of air pollution research may involve more than \$4.3 million in the next five years.

The programme will emphasize control of sulphur oxides produced at coal-burning electric generating stations. Primary aims of the programme will be to determine the maximum concentration of sulphur oxides in the air at ground level that is compatible with good public health, and to find economically feasible means of controlling sulphur oxide emission from power plants while avoiding excessive costs for electric service to the consumer.

Vehicle Pollution Regulations

The *Federal Register*, an official government gazette, for 30 March, 1966 (vol. 31, no. 61) is concerned with the *Control of Air Pollution from new Motor Vehicles and New Motor Vehicle Engines*. It contains the detailed rules and regulations, covering general provisions, crankcase emissions, exhaust emissions, certification of motor vehicles and motor vehicle engines, hearings on certification, and test procedure for vehicle exhaust emissions (gasoline engines).

Australasia

CLEAN AIR SOCIETY FORMED

A Clean Air Society for Australasia has recently been formed, and at a meeting attended by about 200 people from various sections of the community, a Foundation Council was set up, with Dr. J. L. Sullivan as its President. Australian and New Zealand representatives are on the Council, which is now in process of forming state branches.

AIR POLLUTION EVENTS IN SOUTH AFRICA

from C. E. Latsky, Air Pollution Research Group

National Control Legislation

The Atmospheric Pollution Prevention Act* was promulgated on 17 April, 1965, but no implementation was possible before the necessary statutory appointments in terms of Part I of the Act had been made.

National Air Pollution Advisory Committee

At the Fifth Annual Conference of Contributors to the Air Pollution Research Fund, held on 8 February, 1966, the Secretary for Health, in opening the proceedings, announced the names of the members of the National Air Pollution Advisory Committee which is provided for by the Act. It was announced that the Hon. the Minister of Health had nominated Dr. E. C. Halliday, Head of the C.S.I.R. Air Pollution Research Group, to the Chairmanship of the Committee.

Chief Air Pollution Control Officer

The next step towards implementation of the Act will be the appointment of a Chief Air Pollution Control Officer. This post has already been advertised and it is expected that an appointment may be made within the foreseeable future. His duties will correspond broadly with those of the Chief Alkali Inspectors of England and Scotland, with control of scheduled (chemical) processes, while smoke pollution as such will be handled separately by the local authorities. The first municipalities to apply to the Minister of Health for the proclamation of declared areas in terms of Part III of the Act (smoke control) are Port Elizabeth and Durban City Councils. It is likely that the applications will be considered at the first meeting of the newly-appointed National Committee. These declared

areas are not "smokeless zones" in the British meaning of the term. A declared area is simply one in which the provisions of the entire Part III of the Act are applicable. In terms of Section 18, a local authority has the option of promulgating by-laws for the control of smoke and in terms of Section 20 it has the option to order the establishment of smoke control zones within a declared area. Both of these steps must have the approval of the Republic's Minister of Health.

Diesel Smoke Control

Another matter which has received considerable attention during the past year has been the control of excessively black smoke from diesel vehicles, which was pursued with the assistance of the South African Road Safety Council. The problem is particularly serious in South Africa, as the major portion of the country's industrial area lies on the inland plateau at altitudes of 4,000–6,000 feet. The Council has constituted an *ad hoc* committee for this purpose and, at its latest meeting, held on 24 February, 1966, the latter decided to recommend a provisional smoke blackness limit of 80 on the Hartridge meter scale, using the Belgian free engine acceleration type of test. The Hartridge meter was recommended as the standard test instrument, but traffic authorities are to be permitted the option of using a simpler portable instrument for roadside monitoring purposes (such as the Bosch) and its readings will be correlated by means of the standard curves derived by Messrs. Robert Bosch and the S.A.E. Any disputes likely to arise would then be settled with reference to the standard Hartridge instrument.

It is expected that these provisions will be incorporated in the traffic regulations attaching to the Traffic Ordinances of the four provinces of the Republic of South Africa.

* Described in SMOKELESS AIR, Spring, 1966 (No. 137), page 185.

Other possible methods of preventive action, particularly pertaining to the licensing and rating of vehicles, the sealing of critical engine adjustments, and so forth, are to be referred to a separate committee. It is possible that provisions of this kind may be incorporated in the new nationally-uniform Road Traffic Ordinances that are expected to be promulgated in the near future. If action along these lines is successful, it is not expected that the Minister of Health will invoke the provisions of Part V of the Atmospheric Pollution Prevention Act at all.

Fifth Air Pollution Conference

On 8 February, 1966, the fifth of a series of annual conferences was held, on this occasion in Pretoria. It was attended by the representatives of some 30 firms and 22 local councils that are contributors supporting the air pollution research work of the C.S.I.R. In addition, there were representatives from some guest organizations, the four provincial administrations, the Department of Health, the Department of Planning, the South African Railways Administration, the Department of Agricultural Technical Services and the United Municipal Executive.

The proceedings were opened by the Secretary for Health who, as I have said, announced the identity of the new National Committee and indicated that the Government intended positive action to abate the air pollution menace in South Africa.

The Chairman of the Conference, Dr. Niko Stutterheim, then presented a report on behalf of the Standing Committee of Contributors which acts as the trustee of the funds donated for research work by the C.S.I.R. It was clear that financial support from outside bodies, which had been regularly obtained for some five years, was now on the wane and that in the coming financial year, the major burden of the support of the Air Pollution Research Group would be thrust upon the C.S.I.R. More extensive Government

support had the support of the Department of Health, but the decision rested with the Department of Planning and the Treasury.

A recommendation by the Fourth Annual Conference to the effect that a national training course should be created for boiler house supervisors, was being followed up with the appropriate authorities.

As a result of another motion at the previous conference, a reply had been received from the South African Railways intimating that the railways had appointed special smoke inspectors at the major centres of Cape Town, Port Elizabeth, Durban and Johannesburg.

The A.P.R.G. on the other hand was taking steps through the Associated Scientific and Technical Societies of South Africa to spread knowledge about the handling of air pollution problems in various scientific and industrial fields.

A Technical Assistant of the A.P.R.G., Mr. H. M. Langenberg, read a paper on the subject of *The Technique and Purpose of Micro-meteorological Investigations in Relation to Air Pollution*. He described a method used by the Group for determining air temperature profiles by the use of modified radiosonde transmitters suspended from a captive kite balloon. It was found that higher altitudes could be achieved with the use of radio data transmission, than when electric leads were used to convey the measurements to the ground. One of the peculiar local problems is that much of South Africa lies on a plateau from 4,000–6,000 feet above sea level. Consequently the lifting power of balloons of reasonable size is severely limited. The equipment, of the German *Graw* type, was originally used by the Weather Bureau at a frequency which now finds itself in the local FM broadcast band. The units were therefore modified so as to transmit in the 53 to 54 MHz telemetry band. The ground receiving station consists of a simple super-regenerative transistor receiver which is hand-held. Temperatures are coded

in tone-modulated morse characters.

Interspersed in the proceedings of the day, was a series of reports by individual local authorities. They were Cape Town, Germiston, Bloemfontein, Pretoria, Johannesburg and Durban City Councils. They reported on measurements of air pollution being regularly performed in their areas and on the control activities that they were able to undertake at this stage.

The Chairman of the Technical Advisory Committee of the A.P.R.G., Dr. A. Strasheim (Director, National Physical Research Laboratory), reported on the progress that the C.S.I.R. Air Pollution Research Group has made during the past five years in research. He reviewed the early history leading to the creation of a research fund and organization in 1960, and to the original objectives that had been set for this research at that time. His review covered specific projects aimed at meeting those objectives and which were broadly the following: methods of control, the design of combustion equipment, fuel availability surveys, the analyses of atmospheric pollution over cities, the routine measurement of smoke and sulphur dioxide in various centres, the evolution of improved smoke and sulphur dioxide measuring techniques, collaboration with other bodies and the provision of technical information. He also mentioned that the Group had performed many *ad hoc* investigations under contract to various industries.

A new Standing Committee of Contributors was elected to represent the interests of the sponsors during the present year, and to act as trustees to the Fund.

During the afternoon Mr. L. E. Tucker, the Johannesburg Air Pollution Control Officer, presented a paper on *Standard By-laws for Smoke Control by Local Authorities*. It appears that in terms of a Transvaal provincial ordinance, it is possible for local authorities (here called, municipalities) to adopt standard by-laws which have already been approved by the Administrator of the Province, with a minimum of

attendant complication. Consequently, Johannesburg City Council, which was a pioneer in formulating by-laws in anticipation of the coming of the Act, put forward its proposed by-laws as a draft for consideration by municipal bodies and for possible approval by the Administrator as standard by-laws. Each council wishing to proclaim the by-laws would of course have to make application to the Provincial Administration for permission to do so. In terms of the Act, smoke control by-laws must have the approval of the Minister of Health acting in consultation with the National Committee.

Mr. D. N. Giles, an industrial air pollution consultant in Johannesburg, read a paper introducing delegates to the broad field of the measurement of pollution in stacks. He displayed a sampling set-up which he had evolved for all-round sampling of a wide variety of chemical effluents, as well as the well-known B.C.U.R.A. stack cyclone probe.

The proceedings concluded with a report by Mr. W. G. B. Mandersloot on behalf of the Chemical Engineering Group of the C.S.I.R. He indicated that his Group, which collaborates with the A.P.R.G., was concentrating on: the determination of gaseous and particulate emissions by industry, the selection of gas-cleaning equipment and determinations of its efficiency, research on the collection of pollutants before emission (and their disposal), stack height calculations, and, the indexing of documents pertaining to air pollution control engineering. His Group has evolved a deep indexing system using descriptors and an inverted punched-card index for quick retrieval of references to gas-cleaning and related chemical engineering techniques.

Air Pollution in Hong Kong

Two British experts on air pollution have been to Hong Kong to study the problem of smoke from the China Light & Power Company's generating

station at Hok Yuen.

The experts, Mr. A. J. Clarke and Mr. S. Catchpole, of the Central Electricity Generating Board, had been invited by the Hong Kong Government to spend two weeks in the Colony to give advice on how to reduce the possible health risk, discomfort to the public and damage to property caused by the smoke and sulphur dioxide from the power station's chimneys, without materially affecting the output of the station or raising the height of the chimneys.

Mr. Clarke and Mr. Catchpole also advised on the optimum distribution of generating capacity between the Hok Yuen power station and the proposed new station on Tsing Yi Island, from the point of view of reducing the emission of smoke and sulphur dioxide from chimneys.

France

JOINT A.P. COMMITTEE

In an effort to step up their fight against atmospheric pollution in France, three organizations which are active in this field have formed a *Comité de Coordination pour la Prévention de la Pollution Atmosphérique* (Co-ordinating Committee for the Prevention of Atmospheric Pollution).

The three organizations represented on the co-ordinating committee are the *Association pour la Prévention de la Pollution Atmosphérique* (APPA)—The Association for the Prevention of Atmospheric Pollution—the *Comité d'Action Technique contre la Pollution Atmosphérique* (CAPTA)—the Technical Action Committee Against Atmospheric Pollution—and the *Comité National d'Action pour l'Assainissement de l'Atmosphère* (CAPA)—the National Action Committee for Clean Air.

Each of the organizations has interests in particular areas of air pollution. APPA studies the effects of atmospheric pollution on public health, on animal and plant life and on buildings, and is also active in educating the public about the dangers of pollution.

CAPTA is concerned with the problem of pollution caused by stationary furnaces and industrial plant generally, while CAPA studies pollution from road vehicles.

The quarterly revue *Pollution Atmosphérique* becomes the official journal of the co-ordinating committee which has its headquarters at 21 rue Murillo Paris 8e.

Sweden

VEHICLE EMISSION CONTROL DEVICE

With one eye on the U.S. market, a Swedish auto accessory manufacturer has started producing an anti-smog unit that not only reduces exhaust pollutants but also claims boost engine power and fuel economy.

Unlike the devices that Detroit plans to add to American cars late next year, the Swedish unit works before combustion rather than after. It aerates a small amount of an un-named liquid chemical and adds it to the air drawn through the carburettor. The engine then burns the chemically treated air along with conventional gasoline.

Result, says C. H. Edlundh, president of the company that bears his name, is a decrease in carbon monoxide in the exhaust from 6–10 per cent by volume to 0.7 per cent at speeds between 50 and 60 m.p.h. At idling speed, carbon monoxide drops to 0.1 per cent. Such results, notes Edlundh, more than meet the California law limiting carbon monoxide to 1.5 per cent by volume.

Higher power

The same tests show that the device, named a Sands gasmixer after its inventor, Bertil Sandstroem, increases power by 10 per cent while reducing fuel consumption by 10 per cent. All results are now being confirmed by Sweden's National Institute for Materials Testing, which is comparable to the US National Bureau of Standards.

The fuel saving would just about offset the cost of the chemical, which is about 1 cent for 30 miles of driving. The unit will sell in Sweden for about \$50, installed. Edlundh, hoping to capture a portion of the market in the U.S. now that pollution control devices have been made manda-

tory, will probably license the gasmixer to an American manufacturer.

Although Sweden does not yet have laws regulating auto emissions, the government has just established a research committee to determine which is the best exhaust purification system.—*Product Engineering, New York.*

Correspondence

VEHICLE POLLUTION STANDARDS IN CALIFORNIA

*The Editor
Smokeless Air*

Sir:

We were interested in the discussion on "Vehicle Exhausts and Health" in the Spring issue. It is an accurate and comprehensive survey of the problem with one exception. Mr. H. D. Fawell of the Ministry of Transport on page 200 has incorrectly stated that California standards are intended to reduce hydrocarbon and oxide of nitrogen emissions, not carbon monoxide.

The fact is that our standards are aimed at reducing both hydrocarbons and carbon monoxide. The standard for the former is 275 p.p.m., while the standard for the latter is 1.5 per cent by volumes. I am enclosing a summary of the status of control effect in California as of 1 April.

We have only recently turned our attention to oxides of nitrogen and set a standard for their control at 350 p.p.m. However, we have no device or attachments for their control approved at this time.

While our standards may not be applicable in England, you may benefit greatly from much of the work we have already carried out in California on American and foreign vehicles. Even the United States Government has adopted our standards for nationwide application on 1968 models, with some slight leeway for smaller foreign vehicles. Of course, the smog attribut-

able to motor vehicles in California is far greater than the smog caused by motor vehicles in England, but we are sure that "an ounce of prevention is worth a pound of cure".

We trust that you are receiving our press releases regularly and are well informed on California's progress. We appreciate receiving your publication and being brought up-to-date on work in your country.

Yours, etc.

ERIC P. GRANT,
Executive Officer.

RAY KOVITZ,
Information Officer.

*State of California,
Motor Vehicle Pollution
Control Board
417 South Hill Street,
Los Angeles, 90013.*

The summary referred to in the letter is as follows:

Vehicles equipped with crankcase control: 6 million.

Hydrocarbon emission prevention by crankcase control: 300,000 gallons per day.

Vehicles equipped with exhaust control: 450,000 vehicles.

Hydrocarbon emission prevention by exhaust control: 63,000 gallons per day.

Carbon monoxide emission prevention by exhaust control: 900 tons per day

Total hydrocarbon emission prevention: 363,000 gallons per day.

Smog stations licensed by CHP: as of 1 March, 1966:

2,425 exhaust and crankcase
1,713 crankcase

4138 total

Insist on Clean Air

This is the neat title of a new leaflet issued by the Women's Gas Federation. Intended for women, it gives a concise account of the ill-effects of air pollution, and on its fourth page puts the case for gas if your district is to be a smoke control area. The leaflet costs 3d., with reducing prices for quantities. More details, and information on other publications may be obtained from the Federation at 5 Grosvenor Crescent, London, S.W.1.

POLLUTION FROM MOTOR VEHICLES

by A. Parker, C.B.E., D.Sc.

Atmospheric Pollution: A Survey of Some Aspects of the Emissions from Petrol-Engine Vehicles and Their Treatment. British Technical Council of the Motor and Petroleum Industries. Pp. 98. Printed by the Associated Octel Co. Ltd., London, 1965. Price £2.

With the increasing density of traffic in many parts of our towns, there is growing concern about the possible effects on health of the pollution of the air near ground level by the exhaust gases from motor vehicles. There are frequent complaints of the emission of dense clouds of black smoke from the diesel engines of heavy vehicles. These objectionable emissions are quite unnecessary; they are due to inadequate maintenance of the engines and control of the rates of admission of fuel, and often gross overloading. With diesel engines in good condition, properly operated and not overloaded, the combustion of the fuel is virtually complete and the amounts of pollutants in the exhaust gases are negligible.

It is the petrol-engined vehicle that is primarily responsible for undue pollution of the air near ground level by carbon monoxide, hydrocarbons, and oxides of nitrogen in areas of dense traffic. In Los Angeles, where the climate is very different from that in this country, the hydrocarbons, oxides of nitrogen, and the ozone in the atmosphere, under the influence of bright sunlight, interact to form compounds that produce mist and reduce visibility, and cause discomfort to the respiratory systems of the inhabitants and are lachrymatory. The position has become so serious in Los Angeles County that the State of California has introduced legislation aimed at reducing the pollution of the air by the exhaust gases from private cars.

Henceforth, most new vehicles in California will have to operate with rates of emission of carbon monoxide and hydrocarbons much lower than are general with existing vehicles. This legislation in California, that may be followed elsewhere, will have its effect not only on vehicles made in the U.S.A. but also on vehicles imported from other countries.

It is not surprising, therefore, that the motor car manufacturers in this and other countries have begun seriously to consider what practicable means can be developed to provide engines that will have the power characteristics desirable but will emit exhaust gases containing only relatively small amounts of pollutants.

Early in 1964, the British Technical Council of the Motor and Petroleum Industries initiated a preliminary review of the subject through its Fuel Committee, which appointed an Atmospheric Pollution (Petrol Engines) Sub-Committee to review present knowledge, technical and legal, on atmospheric pollution from petrol-engined vehicles and to recommend a course of action for consideration. The deliberations of the Sub-Committee led to the preparation of five reports on the following aspects of the subject. 1. A definition of the problem and significance of air pollution from petrol-engined vehicles, 2. Influence of gasoline composition on the constituents of engine exhaust gases, 3. Brief survey of the literature relating to exhaust gas control by means of engine modification, 4. Exhaust system devices for petrol-engined vehicles, and 5. Control of crankcase emissions: a survey of practices within the British motor industry.

The document now published is a collection of the five reports, with a

Preface by the Chairman of the Council and a Summary of the five reports by the Chairman of the Fuels Committee and the Chairman of the Atmospheric Pollution (Petrol Engines) Sub-Committee. The recommendations made by the Sub-Committee to the Fuels Committee and the Council are not specifically stated in the document; but on the basis of the background information provided by the survey, the Council have appointed two sub-committees representative of the motor and petroleum industries to explore and develop further means of lessening the atmospheric pollution contributed by motor vehicles. It will be interesting to know in due course on what lines development investigations are proceeding and with what promise of real success.

National Legislation[†]

At the end of each of the first four of the reports, there is a useful list of selected references to publications on the subject. The first of the five reports includes a brief summary of appropriate legislation in the United Kingdom, U.S.A., Victoria, Australia, Canada, France, Belgium, Germany, Ireland, Switzerland, Norway, Czechoslovakia, U.S.S.R. and a brief general reference to some other countries; it then discusses the public health significance of the pollutants. The contents of the other four reports are adequately indicated by their titles.

It is realized that the reports are not intended to be more than brief surveys of available information. The first two of the reports, however, are disappointing in that the value of the literature examined and the reliability of the data given have not been properly assessed. There seems also to have been insufficient collaboration between the authors of these two reports. As a result there is a lack of balance and statements are made and figures given in different parts that are not in agreement and could be misleading.

For example, according to estimates given in Table 5 of the first report, the amount of carbon monoxide emitted in

1963 from petrol-engined vehicles was about 2.5 million tons in this country, with 1.2 million tons from the domestic and commercial use of solid fuel and none from the industrial use of solid fuel, to give a total of about 3.7 million tons. On the basis of these estimates, which cannot be right, it is stated in the text that the automotive vehicle is contributing over 60 per cent of the carbon monoxide. In a table on page 41 of the second report, 4 per cent is given as a typical concentration of carbon monoxide in the exhaust gas from the petrol engine. Accepting this figure of 4 per cent as about right, the amount of carbon monoxide discharged from the use in 1963 of 9.0 million tons of motor spirit must have been over 5 million tons and not 2.5 million tons.

On page 45 of the second report it is said that the Beaver report stated that the total emission of carbon monoxide in the United Kingdom in 1954 was about 24 million tons per year, composed of 10 million tons from industrial chimneys, 10 million tons from domestic chimneys and 4 million tons from gasoline engine, motor vehicle exhausts. In fact these figures for annual discharges were first given by the present reviewer in a paper to the Institution of Civil Engineers in November, 1953 (obviously not for 1954) and they were also given in the Interim Report (not the Final Report) of the Beaver Committee published in December 1953.

The position has changed greatly since 1953. As a result of the Clean Air Act, 1956, and from other causes, the efficiencies with which fuels are used in industry have been greatly improved with a considerable reduction in the amounts of smoke and carbon monoxide emitted; and there have been reductions in the amounts of solid fuel used for domestic heating. At the same time there has been an increase in the consumption of petrol by motor vehicles. In consequence, the reviewer's estimates of the emission of carbon monoxide in this country in 1964 are 6 million tons from motor vehicles, and 12 million tons from other uses of fuels, including 5.5 million tons

from domestic heating appliances.

The third, fourth, and fifth reports in the document are concise, useful, and interesting. The reviewer fully agrees with the conclusion, as stated in the overall summary following the preface, that the most rewarding approach will probably come eventually from developments in engine design and that the main improvement that can be expected is an ability to burn the gasoline more efficiently over a wider range of operating conditions than at present. There are effective

devices, that no doubt could be improved in detailed design, for dealing with crankcase fumes. These are at present fitted to many cars and their use will probably be extended and eventually made compulsory. In the opinion of the reviewer, it is unlikely that devices such as after-burners, including those containing catalysts, will be a reliable and convenient means of greatly reducing the quantities of pollutants emitted in the exhaust gases of petrol engines.

Coal Board to Treble “Multiheat” Production

The National Coal Board's new smokeless fuel plant at Crown Works, Cardiff, which came into production in November, ahead of schedule, is to be trebled in size to produce about 330,000 tons annually of “Multiheat”.

“Multiheat”, which is not unlike the Coal Board's “Phurnacite” in appearance, is another top-quality smokeless fuel designed primarily for independent and central heating boilers and room-heaters, but it is also being used very successfully on modern open fires. It is made from fine anthracite and coking coal, all produced within the Board's South Western Division.

The expansion of the Cardiff plant to a three-kiln unit will cost just over £2 million. The process already uses the latest techniques, including closed circuit television, to achieve a high degree of mechanization. Further automation will mean only a one-third increase in the labour force, to 187, despite the big increase in production.

The plant is being concentrated at Cardiff because substantial facilities are already available there. These include buildings, rail sidings, coal dryers and electrostatic dust precipitators.

Construction work will begin shortly, and the two new kilns are expected to

be in production for the winter of 1967-8. By that time, the combined annual outputs of the “Phurnacite” plant at Aberaman and the Cardiff “Multiheat” plant will be well over a million tons.

The main markets for “Multiheat” will continue to be in London and the South and West of England, where it has received an excellent response.

The process

“Multiheat” is made by a fluidized sand bed process.

Rotary presses are used to make ovoids from fine anthracite (about 90 per cent), South Wales coking coal (about 10 per cent), with the addition of a little pitch and creosote oil as a binding agent.

These ovoids are moved through a heated sand bed contained in a 103-foot-long refractory-lined steel kiln. The sand is fluidized (made to behave like a liquid) by the introduction of air via a series of distribution chambers.

After 75-90 minutes in the kiln the ovoids emerge as smokeless briquettes ready for cooling and despatch. Volatiles evolved during the heating process are drawn off and burned in the furnace which heats the sand.

ELECTRICAL VEHICLE DEVELOPMENTS

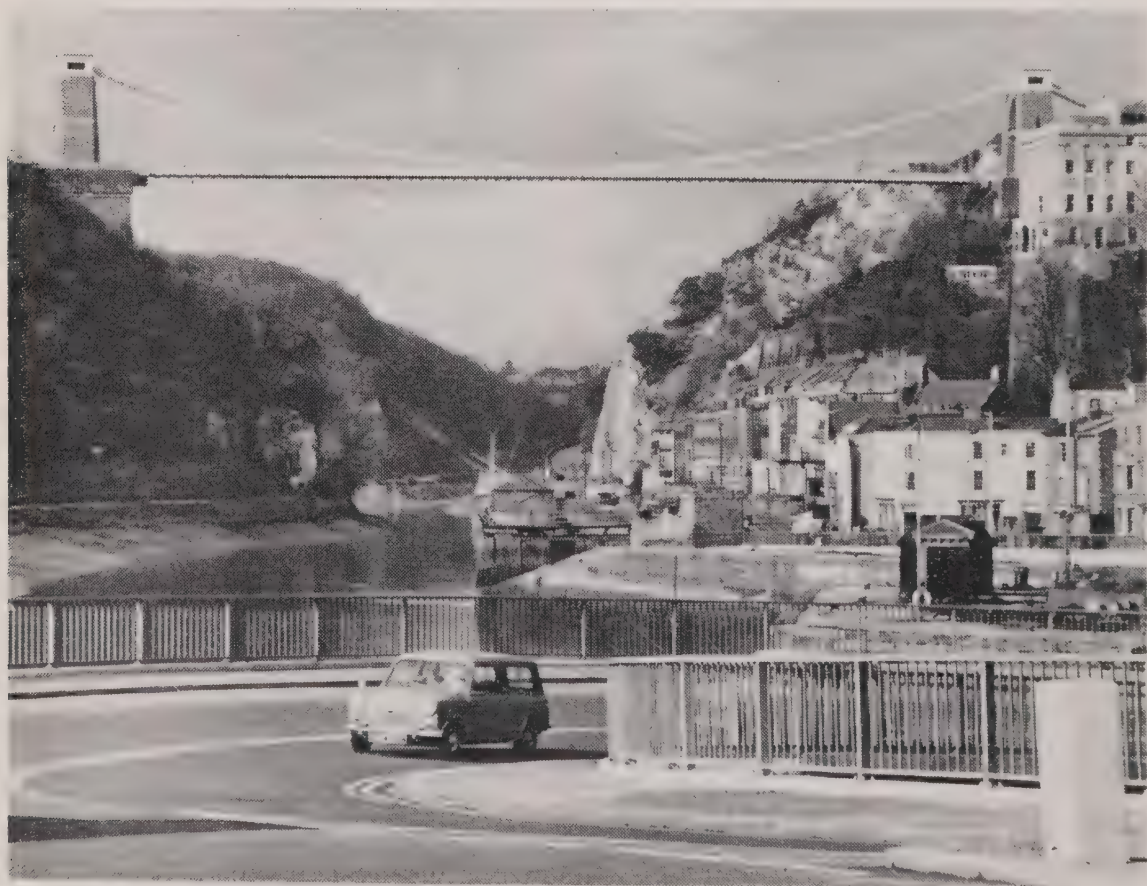
London Demonstration

The encouragement of electrically driven vehicles must be one of the interests of the clean air movement because the growing problem of air pollution from road traffic, especially in congested urban areas, could be greatly ameliorated (and in designated places perhaps entirely eliminated) by the use of fumeless battery driven vehicles. Although there are difficulties and obstacles in the way, progress is being made, and an informative Interim Report on "Battery Electric Passenger Cars" was published by the Electricity Council in March last. This gives a balanced assessment of the advantages and disadvantages of the electric vehicle, of which there are now 40,000 in use in the United Kingdom.

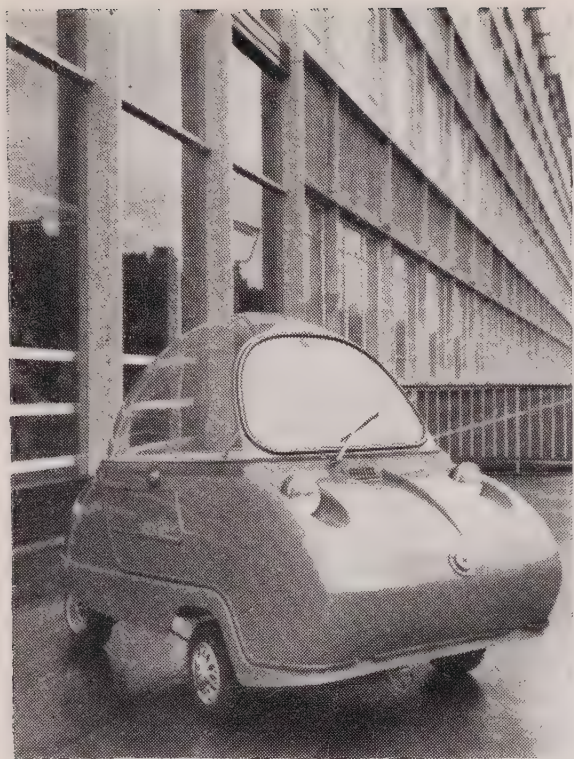
On 21 March a demonstration was given in London of several new vehicles.

These included two electric Minis, converted from conventional IC engine drive, and an experimental purpose-built short range electric car called the "Scamp". Recharged by plugging in to off-peak electricity, running costs are about $\frac{1}{2}$ d. per mile.

The cars were shown by the Electricity Council as a stage in the evolution of an all-purpose, short-range commuting and town centre car. The mini-conversions are part of the Electricity Council's Appliance and Methods Research Panel and have been three years in development. They were converted for the Electricity Council by private firms, including Associated Electrical Industries Ltd., and Telearchics Ltd., on two separate and different systems. The aim was to establish technical data about the



The converted Mini-Traveller taking a bend at 35 m.p.h. in Bristol



The four-wheel Peel Trident "electric" car

acceleration, speed, and range of the electric cars of the future.

In addition, a fourth car, a small bubble-type, converted to electric drive by the Isle of Man firm, Peel Engineering was also shown.

The "Scamp" is a development by the aircraft firm Scottish Aviation. The model shown was experimental.

On costs, it was said that battery electric cars for 100 miles use a week could prove to have only one third of the total running costs of similarly used, small IC engined cars. Energy costs alone could be as low as the equivalent of 130-170 miles per gallon.

Mr. A. N. Irens*, Chairman of the Electricity Council's Appliance and Methods Research Panel and Chairman of the South Western Electricity Board said: "The era of the battery electric car has not arrived yet. But it now need not be far away. If, as we hope, industry recognises that Britain could achieve a major first in electric road traction, fresh research programmes could solve the remaining

problems. This would mean that Britain would have fast, efficient, economical short-range transport which would contribute to the solution of, rather than adding to, the problems of traffic congestion and air pollution hazards.

"Developments in batteries have been foreshadowed which could greatly increase the effective range of electric cars. It is in this area that the greatest effort in research is needed. The Electricity Council intends to do work in this field in collaboration with battery manufacturers. Given enterprise, courage and swift action the battery electric car will be positively confirmed as the commuter and town car of the future."

Main Details of the Vehicles Demonstrated

Research Vehicle Number One, is a BMC Mini-Traveller converted to electric drive by Associated Electrical Industries. The batteries have 48 cells with a nominal voltage of 96V. There is a built-in charger which enables the vehicle to be plugged-in to any 13 or 15 amp electric socket outlet for re-charging. The car has a Thyristor pulse control unit with regenerative braking. There is a 96V. traction motor with chain drive to a differential gear box. The car has a maximum speed of 41 m.p.h. on level ground and acceleration from rest of 0-20 m.p.h. in seven seconds. The range non-stop on level ground is 30 miles. The car has been extensively road tested in Bristol and has proved satisfactory. It is a two-seater with ample luggage space. The energy cost is about $\frac{1}{2}$ d. per mile.

Research Vehicle Number Two, is a BMC Mini-Traveller originally converted by Telearchics Ltd. Its dry accumulator has 32 cells of nominal voltage of 64V. Its control system is a 16 in. carbon pile regulator hydraulically controlled. The car has two forced cooled series motors connected in parallel to drive the two front road wheels. Maximum speed on level ground is 40 m.p.h. Acceleration 4 m.p.h./sec. to 20 m.p.h. Range non-

* A paper on Electric Vehicles is to be presented by Mr. Irens at the International Clean Air Congress in October.

stop at maximum speed is 28 miles. Two-seater with ample luggage space.

"*Scamp*". This purpose-built car has an overall length of 7 ft., width 3 ft. 10 in. and height 4 ft. 6 in. Its turning circle is $16\frac{1}{2}$ ft. with a kerb weight of under 1,000 lb. It has a carbon pile regulator control system and two motors driving each of the rear wheels through a chain drive. Scottish Aviation, the makers, state that the car has a 35 m.p.h. maximum speed and 30 m.p.h. cruising speed. Its initial acceleration is 4 m.p.h./sec. Maximum climbable gradient from rest is 1 in 4 and the range in the production model will be 15-20 m.p.h. Its energy costs are said to be equivalent to 170 miles to the gallon.

Peel Engineering Trident. This is a four wheel, one or two-seater baby car of 6 ft. length and 3 ft. 6 in. width. It operates on two 12V. batteries with a carbon pile regulator. The makers state the maximum speed to be 35 m.p.h. and range approximately 40 miles. Acceleration is 4 m.p.h./sec.



The Scottish Aviation "Scamp" electric car outside Cossham hospital, Bristol

Swedish Oil Burners to be Marketed in Britain

Having established a flourishing market for their Electro-Oil automatic oil burners in Scandinavia and the Continent of Europe, the manufacturers, E. Palm and Company Limited, of Norrkeoping, Sweden, are now launching their complete range of burners in the United Kingdom.

The burners, of which there are nearly 40 models, range from outputs of 40,000 BTU/h to the heavy industrial models giving outputs of over 6 million BTU/h. Prices range from £45 to £560, which, in spite of import duties, make them very competitive. There are many features of Electro-Oil burners which will be of interest to British industry. The industrial burners, the H.T. Series, have the capacity to operate with oils covering a very wide viscosity range, and are supplied pre-wired ready for firing upon delivery. Each series, domestic and industrial, has a free-burning model which eliminates the necessity for refractory linings in the boilers.

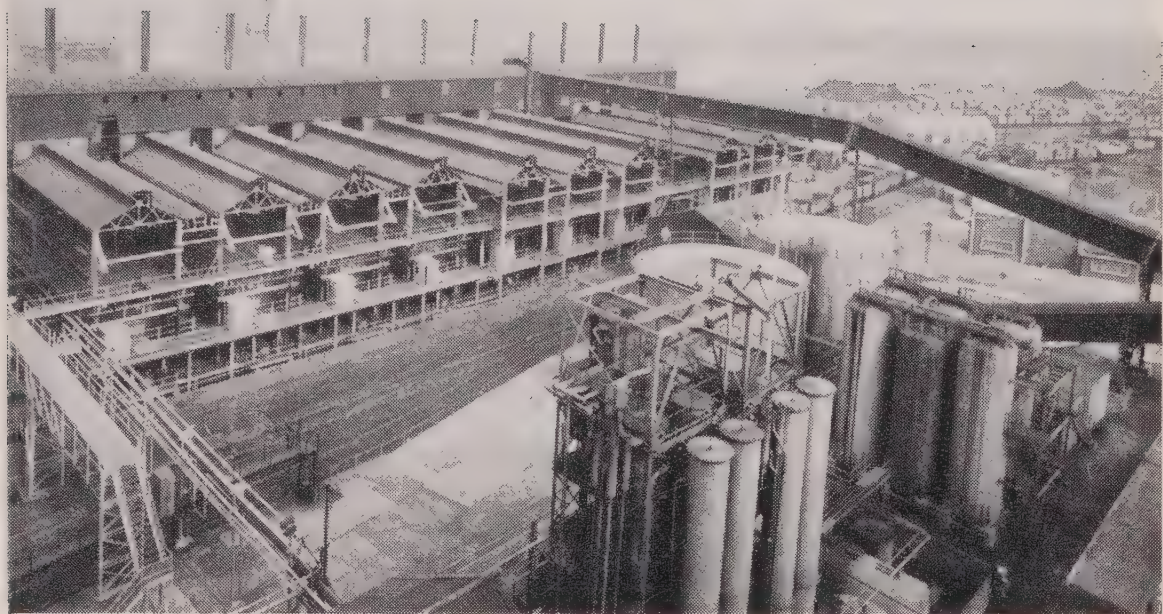
Further information may be obtained from Electro-Oil Automatic Oil Burners Ltd., 36 Folly Lane, Hockley, Essex.

Rating of Room Heaters

The Domestic Solid Fuel Appliances Approval Council announces that in agreement with appliance manufacturers room heaters will be rated on an individual basis, and that the new issue of the Approved Domestic Solid Fuel Appliances list (No. 23) will show the heat outputs in Btu/h both for direct room heating and hot water. A note covering the investigations and reasons for this new approach has been issued, and may be obtained by those concerned with the selection and installation of domestic heating equipment from the Council at Hyde Park House, 4-5 Grosvenor Place, London, S.W.1.

Metropolitan Engineering Co. Ltd.

In our last issue (p. 210) we mentioned the informative technical bulletins issued by this firm, but unfortunately quoted a former address. The new address is Metro-Flex Works, 14 Earl Cottages, Earl Road, London, S.E.1.



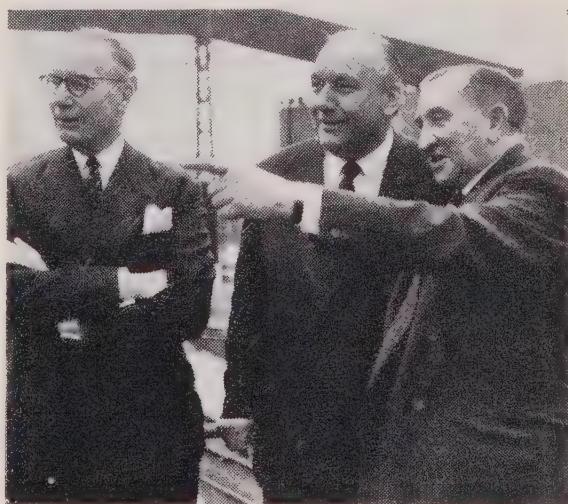
Coalite's Open Day

Coalite and Chemical Products Ltd. held a very successful and enjoyable open day on 18 May, when a gathering of the Company's many friends assembled at the Askern Colliery, near Doncaster, where is situated one of the Coalite carbonizing plants. Prior to an inspection of the plant there was a *marquéé* luncheon when there were speeches by the guest of honour, Lord Robens, by the Chairman of the Company, Commander Colin Buist, and by the Deputy Chairman and Managing Director, Francis Waring. Excellent speeches, all.

Commander Buist looked back at the past for a few moments—to the time when Thomas Parker invented the Coalite process, and then the redoubtable Colonel Bristow made the company swim when all around other low temperature processes just sank. Time has justified the faith of the

The modernized Coalite works at Askern

pioneers—it was, and still is, a first-class way of making a first-class smokeless fuel. It is pleasing to remember that the NSCA and its forebearers and the Company, have always recognized the value of each to the other, and have so remained good friends ever since those early days.



At Askern, l. to r. Commander Colin Buist, Lord Robens, Mr. Francis Waring

The River Must Live

In an editorial comment on an earlier page the idea is broached of closer links between those who are defending the environment against various kinds of pollution and other assault. By coincidence, since that was written, the opportunity of seeing a remarkable new film on water pollution, *The River Must Live*, has seemed to present an excellent opportunity of testing the idea of co-ordination in practice—simply by giving a notice of this film in a journal devoted to air pollution.

The point is that no one who is concerned about the pollution of the air can fail to be intensely interested in this vivid documentary that describes how a great river can be poisoned and made utterly foul by the pollution that is poured into it from the towns through which

it passes and the industrial discharges it receives. But the film was not made only to show what happens when a river is overloaded with waste, but also to describe what can be done about it. To quote from the printed description:

“To protect the river and keep it healthy, pollution must be prevented, not merely cured, and the way a river absorbs waste must be understood. The film shows in microscopic detail the organisms which preserve the balance of life in a healthy river. The natural mechanism of self-purification is slow; it needs time and space. Too much waste in too short a space overloads the river, killing the micro-organisms which keep it clean. The river then becomes permanently polluted.

“This can be prevented by much

Stills from “The River Must Live”. Below, the birth of the river; right, above, the river passes through a town; below, the river polluted



more widespread treatment of industrial and urban waste. The methods are known—physical separation, chemical and biological purification. To apply them fully will be expensive but the benefits will greatly outweigh the cost. Only then will it be possible to have both a healthy environment and an assured supply of water sufficient for the needs of our industrial society.”

There is a dramatic quality about the telling of this story of a river, aided by

skilful photography and use of colour, plus the brilliant microphotography of life (and death) in the river, which make this a great documentary. As the discerning reader may by now have guessed, it is by the Shell Film Unit, and having said that there seems little more to add by way of recommendation.

Running time is 21 minutes, and the film is available on loan in 16mm. size from: Petroleum Film Bureau, 4 Brook Street, Hanover Square, London, W.1.

Clean Air in Parliament

Vehicle Exhaust Fumes (Deaths)

Mr. Hobden asked the Minister of Health if he will give an estimate of deaths in this country caused annually by vehicle exhaust fumes.

Mr. K. Robinson (written answer): The numbers of deaths in England and Wales assigned in recent years to ICD category E891, “Accidental poisoning by motor vehicles exhaust gas”, are as follows:

1960	1961	1962	1963	1964
12	15	17	23	26

In the same years, the following numbers of deaths were assigned to ICD category E973, “Suicide and self-inflicted injury by other gases”:

1960	1961	1962	1963	1964
102	119	117	125	143

It is known that the great majority of these deaths were caused by motor vehicle exhaust gas. (17 February.)

Smoke Control Orders

Mr. Gurden asked the Minister of Housing and Local Government why he continues to confirm smoke control orders under the Clean Air Act 1956 when there is evidence of shortage of smokeless fuel.

Mr. Mellish: Before confirming a smoke control order my right hon. Friend requires an assurance from the local authority that it is satisfied, after consultation with the fuel producers and suppliers, that supplies of smokeless fuels will, by the time the order comes into operation, be sufficient to

meet the demand in the area covered by the order.

Confirmation has not recently had to be withheld on the grounds that this assurance has been lacking. (28 April.)

Domestic Coke (Price)

Mr. George H. Perry asked the Minister of Power if he will seek power to enable himself to stabilise the price of domestic coke, in view of the financial hardship being experienced by people resident in smokeless zones.

Mr. Marsh: Coke is one of a number of fuels which can be used in smoke control areas. To hold the price artificially low would be a misuse of resources.

In cases of serious hardship, the National Assistance Board is, of course, willing to give special help to those qualifying for assistance to tide them over the transfer to smokeless fuels. (10 May.)

Motor Vehicles (Exhaust Fumes)

Mr. Francis Noel-Baker asked the Minister of Transport what further steps she will take to reduce air pollution by petrol and diesel motor vehicles; and what reports she has received on this subject from her officials in the South-West, including Swindon.

Mr. Swinger: The motor industry is already investigating means of reducing fumes from petrol-engined vehicles and studies are being carried out to see

—Concluded p. 272

SMOKE CONTROL AREAS

Progress Report

POSITION TO 1 APRIL, 1966—TOTALS

	England and Wales	Scotland
Smokeless Zones (Local Acts) in Operation ..	44	1
<i>Acres</i> , 3,400		
<i>Premises</i> , 41,060		
Smoke Control Areas in Operation	1,773	63
<i>Acres</i>	412,149	25,532
<i>Premises</i>	2,311,487	148,280
Smoke Control Orders		
<i>Confirmed</i>	234	15
<i>Submitted</i>	118	4
Grand Totals	2,169	83

The lists below are supplementary to the information in the last issue of "Smokeless Air" (Spring, 1966) which gave the position up to 1 January, 1966. They now show changes and additions to 1 April, 1966.

Some of the areas listed are new housing estates, or areas to be developed for housing. The total number of premises involved will therefore increase. An asterisk denotes that there have been objections and that a formal inquiry has been or will be held.

The list of new areas in operation of smoke control is based on the plans submitted to the Ministry of Housing but may erroneously include some local authorities who have made postponements without notifying the Ministry of the fact.

ENGLAND AND WALES

NEW SMOKE CONTROL ORDERS IN OPERATION

- Northern**
Tyneside and Wearside
Newburn U.D.
- Yorkshire**
West Riding (North)
Morley B. (No. 32).

- North Western**
South Lancashire and North East Cheshire
Stalybridge B. (Buckham Vale Road),
Salford C.B. No. 10.
- Midlands**
West Midlands
Dudley C.B. (Spring Parklands).

NEW ORDERS CONFIRMED BUT NOT YET IN OPERATION

- Northern**
Tyneside and Wearside
Whickham U.D. No. 4.
- Teeside*
Darlington R.D. No. 2.
- Yorkshire**
West Riding (North)
Aireborough U.D. No. 19, Baildon U.D.
Nos. 4-6, Halifax C.B. No. 12, Horsforth
U.D. Nos 20-21, Mirfield U.D. No. 7,
Morley B. No. 33, Ossett B. No. 8, Shipley
U.D. No. 7, Sowerby Bridge U.D. No. 2.
- West Riding (South)*
Swinton U.D. No. 10.
- North Western**
South Lancashire and North-East Cheshire
Ashton-under-Lyne B. No. 6, Bolton

C.B. (Derby Ward Nos. 1–2) (Halliwell Ward) (West Ward Nos. 1–3), *Droylesden U.D. No. 10, Failsworth U.D. No. 5, Manchester C.B. (Whalley Range) (Tamworth St. Hulme) (Radnor St. Hulme), Oldham C.B. No. 8, *Salford C.B. No. 8, Stockport C.B. (Edgeley/Grenville), Whitefield U.D. 5c.

Central Lancashire

Nelson B. No. 1, Preston C.B. No. 14.

Merseyside

Birkenhead C.B. No. 4, Kirkby U.D. No. 4, *Wallasey C.B. No. 11.

Midlands

Derby, Nottingham and Chesterfield

Beeston & Stapleford U.D. No. 7, Sutton-in-Ashfield U.D. Nos. 1, 3.

West Midlands

Coventry B. No. 8, Sutton Coldfield B. Nos. 6–7, Wolverhampton C.B. No. 7 and *8.

London

Greater London Council

Bromley L.B. No. 1, Camden L.B. (St. Pancras No. 7) (Hampstead No. 8), Ealing L.B. Nos. 23–25, Enfield L.B. No. 11, Hackney L.B. No. 10, Havering L.B. No. 2, Kensington & Chelsea (Earls Court, Redcliffe and Brompton), Lambeth L.B. No. 16, Merton L.B. No. 2, Newham L.B. No. 3, Richmond-upon-Thames L.B. (Twickenham 5, Barnes No. 7, Richmond No. 7), Sutton L.B. No. 15, Waltham Forest L.B. No. 9, *Wandsworth L.B. No. 7.

Local Authorities Outside the Black Areas

Barnet L.B. No. 1, Basildon U.D. No. 4, Chatham B. No. 3A, Crawley U.D. No. 3 (Langley Green Neighbourhood), Glanford Brigg R.D. (Bottesford, Burringham), Hemel Hempstead B. (Warners End), High Wycombe B. No. 13, *Letchworth U.D. (Norton Road and Wilbury Road), Luton C.B. No. 4, Oxford C.B. No. 5, Seaton Valley U.D. (Cramlington), Staines U.D. No. 7, Warwick B. (St. Johns).

NEW ORDERS SUBMITTED BUT NOT YET CONFIRMED

Northern

Tyneside and Wearside

Hebburn U.D. and Jarrow B. (Monkton Hall).

Teeside

Billingham U.D. No. 4, Middlesbrough C.B. (Lodore, Mandale and Levick), West Hartlepool C.B. No. 4.

Yorkshire

West Riding (North)

*Bingley U.D. No. 13, Bradford C.B. (Wyke), Leeds C.B. Nos. 52–56, Ossett B. No. 9A, Sowerby Bridge U.D. No. 3, Spenborough B. No. 7.

West Riding (South)

Darton U.D. Nos. 1–2, Sheffield C.B. No. 20.

North Western

South Lancashire and North-East Cheshire

Ashton-under-Lyne B. No. 7, Bolton C.B. (Victoria Road), Dukinfield B. (Dewsnap) No. 7, Urmston U.D. Nos. 5, 8, Sale B. No. 7.

Central Lancashire

Church U.D. No. 5, Colne B. No. 4, Preston C.B. No. 15.

Merseyside

Ellesmere Port B. No. 6, Liverpool C.B. Nos. 19–20, St. Helens C.B. Nos. 2–4, Warrington C.B. Nos. 8–9.

Midlands

Derby, Nottingham and Chesterfield

Carlton U.D. No. 2A, Chesterfield R.D. No. 8, Derby C.B. No. 8, Dronfield U.D. No. 2.

West Midlands

Aldridge U.D. Nos. 2, 6, Birmingham C.B. Nos. 123, 124, 126, 127, 129, 132, Wolverhampton C.B. No. 10A.

Potteries

Newcastle-under-Lyme B. No. 6, Stoke-on-Trent C.B. Nos. 7–9, 15.

Greater London

Barnet L.B. No. 2, Brent L.B. No. 2, Bromley L.B. Nos. 2–3, Enfield L.B. Nos. 12–13, Hammersmith L.B. No. 9, Harrow L.B. No. 11, Hillingdon L.B. Nos. 2–4, Lambeth L.B. No. 17, Lewisham L.B. No. 21, Merton L.B. No. 3, Waltham Forest L.B. No. 10.

Local Authorities Outside the Black Areas

Crewe B. No. 3, Gillingham B. No. 4, Littleborough U.D. Nos. 1–2, Whitley Bay B. No. 2, Wortley R.D. (Middlewood and Wadsley).

SCOTLAND

NEW ORDERS CONFIRMED BUT NOT YET IN OPERATION

East Kilbride (West Mains), Edinburgh (Murrayfield/Cramond No. 1), Fife County (Glenrothes No. 1).

SUMMARY OF SMOKE CONTROL PROGRESS

As at 31 December 1966

(1) <i>Region</i>	(2) <i>No. of acres covered by smoke control orders confirmed or awaiting decision</i>	(3) <i>Percentage* of total black area acreage in the region so covered</i>	(4) <i>No. of premises covered by smoke control orders confirmed or awaiting decision</i>	(5) <i>Percentage of total black area premises in the region so covered</i>
Northern	18,865	15.1	82,145	14.9
East and West Ridings	97,310	25.8	344,075	29.5
North Midlands	23,680	8.8	84,595	16.5
Greater London	156,180	47.8	1,398,850	53.0
North Western	101,245	25.2	463,885	27.2
Midlands	50,210	20.2	220,950	21.0
South Western	5,050	19.2	18,105	12.2
Wales and Monmouthshire☆	45	0.01	650	0.2
Totals (black areas)	452,585	21.5	2,613,255	31.8
Outside black areas (all parts) ..	81,845		273,190	
Grand Totals	534,430		2,886,445	

* The percentage shown in columns (3) and (5) above are the percentages of the *total* number of premises in the black areas concerned. In practice it may not always be necessary for the whole of the black area authority's district to be covered by smoke control orders (e.g. there may be some areas of open country).

☆ Adjustment made to exclude non-black areas previously included in error.

Clean Air in Parliament—concluded

whether further regulatory control is necessary in this country.

The main new measures planned for reducing smoke from diesel-engined vehicles are the introduction of a British Standard for diesel engines, the plating of goods vehicles which is aimed partly at preventing vehicles from being either underpowered or overloaded—both common causes of the emission of excessive smoke, and the checking for smoke as part of the annual testing scheme for goods vehicles.

The answer to the second part of the Question is "None". (10 May.)

Clean Air Act (Electric Heaters)

Mr. Richard Mitchell asked the

Minister of Housing and Local Government if he will seek to permit local authorities to pay grants, under the Clean Air Act, to householders who wish to install electric radiant heaters in areas where smokeless solid fuels are difficult to obtain.

Mr. Mellish: Direct acting heaters were excluded from grant because of the strain which they would impose on electricity supplies at peak periods. After consulting his right hon. Friend the Minister of Power, my right hon. Friend the Minister of Housing and Local Government has concluded that the time is not yet ripe to alter this. His right hon. Friend informs him that, overall, supplies of solid smokeless fuels are adequate, although it may not always be possible to obtain the fuel of one's choice. (12 May.)

Clearing the Air



The new Gas Council film "Clearing The Air" gives many facts about smoke control areas and the role of the householder when confronting some of the problems they create for him. Dr. Albert Parker, Past-President of the Society, makes an appearance in the film and the photograph above shows him describing the measure of progress achieved in the various regions of the country. In describing the desultory progress towards clean air, Dr. Parker brings in some pertinent facts that seemingly must be hammered home again and again if progress is to be maintained, let alone increased. He mentions the 33,000 deaths a year from respiratory disease and asks the question, "Do you realize that the weight of air which everyone of us breathes every day is more than fifteen times the weight of the food we consume?—We insist on clean food; why shouldn't we have clean air?" Unfortunately the film is not likely to be used widely for educational purposes as there is a decided slant in favour of gas, to the exclusion of other wholly satisfactory smokeless fuels and it is a great pity

that time could not be found to emphasize the important role of each of these fuels as has been done in earlier films on the subject.

There is very good material in the film and if this drawback can be remedied it would help to ensure that it has a wider use than otherwise seems probable.

"Clearing the Air," 12 minutes, Eastman Colour. This film can be obtained from The Gas Council, 4-5 Grosvenor Place, London, S.W.1.

More Vehicle Examiners

The Society welcomes an announcement that the Ministry of Transport is seeking to recruit 100 more vehicle examiners. We have in fact urged an expansion of the staff of examiners to enable the road checks on diesel vehicles for smoke emission to be carried out on a larger scale. With the extra 100, the number of Ministry examiners engaged on spot checks and other work connected with the testing of vehicles for roadworthiness will be nearly 475.

News

from the Divisions

NORTH WEST

Solid fuel and oil appeared as unexpected partners at a North West Divisional Meeting at Connah's Quay on 1 February. The National Coal Board were hosts for lunch after which the speaker was Mr. I. H. Richards, Technical Service representative of Shell-Mex and B.P. who spoke on the advantages of central heating generally (but oil fuel in particular) for the case of clean air.

In introducing the speaker, Mr. Alan Taylor, member of the Divisional Council, said that there was no misunderstanding about the unusual partnership taking place that day. The National Coal Board fully realized that it would be entertaining one of its arch competitors in the central heating fuel market. In the course of the meeting one fact clearly emerged, that the two fuels were complementary, they were commercial competitors but they had a common interest in bringing down the level of atmospheric pollution.

The Division was welcomed by Councillor D. Jones, Chairman of Connah's Quay Urban District Council, who reminded them that they were meeting within the boundary of the first local authority in Wales to establish a smoke control zone.

YORKSHIRE

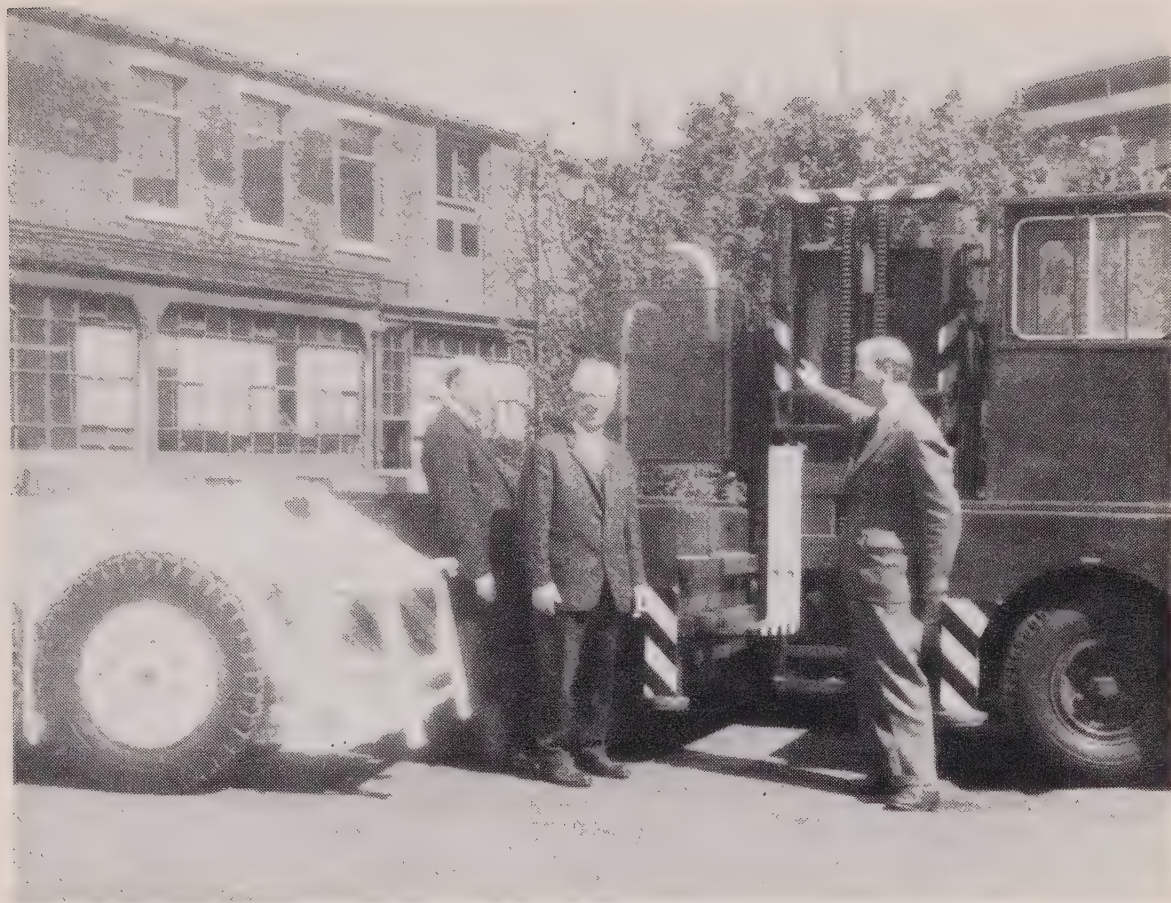
The Annual General Meeting of the Division took place in the Public Health Department, Leeds, on 21 March and was preceded by a more than usually full Divisional Council Meeting. Among matters discussed by the Council was the suggestion that they man the Society's Information and Publicity Stand at the Association of

Public Health Inspectors' Exhibition at Scarborough in September. The Council also considered the report of the Sub-Committee on the "proposed revision of the Clean Air Act" for incorporating in the report to be presented at the open meeting of the Society in London to commemorate the tenth anniversary of the passing of the Act in 1956.

Subsequent to the Annual General Meeting members of the Division attended a meeting at the Hunslet Engine Works and toured the Works in the morning. Members were entertained to a buffet lunch by kind invitation of Hunslet (Holdings) Limited.

The party was particularly interested in the diesel exhaust gas conditioner the Hunslet company have developed. Although the toxic content of the diesel engine exhaust is relatively low it has an unpleasant smell which has to be treated for engines being used in confined spaces. The equipment developed by Hunslet has been submitted to arduous testing by the Ministry of Power and carries their certificate. Its effect is to enable a diesel engine to run safely in the various hazardous conditions encountered, and to do this without causing unpleasant smell and at the same time keeping the toxic content of the neat exhaust within the overall 0.3 per cent permitted. This percentage is then further reduced with free air to provide thoroughly acceptable operating conditions with a toxic level of less than 0.01 per cent.

The second clean air appliance shown to the Yorkshire Divisional members was an automatic underfeed stoker for steam locomotives which ensures an even distribution of coal



Mr. Goodfellow and Mr. Saword at the Yorkshire Division's visit to the Hunslet Engine Works, inspecting the diesel exhaust gas conditioner described in the adjoining report

on the grate, a secondary air supply above the fire and a controlled blast-pipe to ensure correct balance of air availability which enables existing steam locomotives to operate with the requirements of the Clean Air Act.

EAST MIDLANDS

Members of the East Midland Division assembled at Kirkby Colliery on 30 March and were received by Mr. Collinson, Group Manager of the East Midland Division of the National Coal Board and Mr. Gidlow, Manager of Kirkby Colliery. The members divided into two parties and while one group toured the underground working the second party were conducted over the new drift mine. The work of landscaping and grassing down the mine's waste tip, extending over many acres of land, aroused much interest among members. Lunch was served in the East Kirkby Miners' Welfare

Institute by invitation of the National Coal Board and an afternoon business meeting was held in the nearby Festival Hall. After an official welcome had been extended to members by the Chairman of the Kirkby-in-Ashfield Urban District Council (Councillor C. E. Sargent, J.P.), the business of the Division was conducted and an address given by Mr. C. S. Buchan, Chief Engineer, No. 4 Area, National Coal Board, on the Clean Air Act and Collieries.

In his address Mr. Buchan referred to progress made since he had last presented a paper to the Division in 1956. This was due to tireless efforts of local councils and the representatives of the National Union of Mineworkers. It should be recalled that it was to the Coal Board's credit that to a very large degree the number of colliery chimneys belching out black smoke had been eliminated. It was sometimes overlooked, he said, that the conditions imposed by the Clean Air Act took

no account of cost; mining like other businesses must prove both the efficiency of a scheme and submit a detailed financial statement as to its profitability etc. It had been proved conclusively in the Area that steam could be raised efficiently, cheaply and cleanly by using coal producing no black smoke in the effort. Bad chimney stacks had been purged and the considerable measure of the success achieved could be attributed largely to the installation of mechanical stokers, of which 26 had been installed in 1956 and 80 last year. One was often asked why a mechanical stoker had such an advantage over the hand-fired furnace, the simple answer was that with properly regulated feed, and approved quality of coal, even with a high ash content fuel, economical results and smoke-free chimneys could readily be achieved. As the Coal Board's Introduction to Training said "Stoking is no longer regarded as merely slinging coal into a furnace; the man in charge of the boilerhouse can make an important contribution to fuel efficiency if he is properly trained". Mr. Buchan went on to describe the National Coal Board Training Scheme to give colliery boilermen opportunities of brushing up and improving their technical knowledge in a course combining theoretical and practical training. Successful students could win the new certificate of competency set by the City and Guilds of London Institute. The scheme was based on supervised home study conducted through weekly correspondence with the College of Fuel Technology, London. Students gathered for discussion at one day meetings held during the course and official aids and instructional films were used to implement the more conventional forms of tuition. During his address Mr. Buchan described many aspects of colliery practise related to clean air and surveyed the contemporary scene in the mines, with special emphasis on mechanization and the use of diesel locos employing the Giesl Ejector to effect smoke reduction.

The rapid and ever increasing use of

electricity as a prime mover in place of steam had contributed much to the achievement of clean air in colliery operation and the question of smoke, grit and obnoxious fumes from dirt disposal plants, a long sore point with adjoining communities, had been largely overcome. Another most interesting address was given by Mr. J. Henry Barratt, M.P.T.I., F.R.G.S., Deputy County Director of Planning, Nottinghamshire County Council, on "Spoil Tips and Landscaping".

An excellent discussion followed and many questions were answered by the authors of the papers and by Mr. Spenceley, the Assistant Development Plan Officer of the County Planning Department.

Light refreshments were served at the conclusion of the meeting by invitation of the Urban District Council.

NORTH EAST

The Annual Meeting of the Division was held in the Zetland Hotel, Saltburn-by-the-Sea on 6 April. Following the conclusion of the business, Mr. R. D. L. Simes and Mr. R. B. Cutts of the Northern Region of Shell-Mex and B.P. presented an address on recent developments in oil-fired central heating for private dwellings. The speakers presented a very reasoned case for the system favoured by their organization and emphasized the advantages of area installation so that the whole estate could be served by gravity distribution from central storage tanks concealed by trees and shrubs through buried pipe lines. Prior to the meeting, members of the Division toured the Teesport installation of Shell-Mex and B.P. and were entertained to lunch by the host organization.

After the talk members of the Division were taken by coach to the Bace Limited, Ox Close Estate, to inspect the central storage system and Brick central unit installed in the individual houses.

Clean air is automatic with clean electricity



For clean air areas the most natural choice is clean electricity for all home and water heating. Electricity is the only fuel that causes no combustion in the home at all. Always there to be switched on. Nothing to store. Nothing to dispose of.

THREE ELECTRIC CENTRAL HEATING SYSTEMS TO CHOOSE FROM

Electric central heating is automatic, simpler and cheaper to install than other systems. One of them is bound to be suitable for a particular house. All run on half-price electricity. All, of course, comply with the Clean Air Act.

Floorwarming: Cheap to install at construction stage in new houses, built into the floor. Easily controllable, and economical to run.

Electrique: Warm-air central heating with one thermal unit and ducts built into the fabric of new buildings, controllable room by room.

Storage radiators: The most easily installed and practical system for existing houses. Cheapest system of

any to install. Wide variety of storage radiators to choose from.

WATER HEATING, TOO

Electric water heating is extremely economical when a correctly installed immersion heater, or self-contained water heater is used. Various types are available, suitable for whole-house systems, or single-room installations. Your local Electricity Board will be glad to give any advice on heating problems caused by the Clean Air Act. Ask them for a copy of the free leaflet 'Smoke control areas . . . how electricity can help'.



B.C.U.R.A.

Open Day and Annual Report

The British Coal Utilization Research Association held an informal "Open Day" for members and friends at its Leatherhead laboratories on 4 May. As usual a wide range of research and development work was demonstrated—much of it new and therefore fascinating to those not previously acquainted with it. And, again as usual, the occasion brought together a large number of fuel people, and hence provided an enjoyable opportunity for meeting old friends.

From the many activities that were inspected we have selected for description three that have a special importance in the prevention of air pollution. The reports that follow, it should be acknowledged, are based on the useful information sheets that were available.

Domestic Smoke Measurement

About ten years ago a small electrostatic precipitator was developed in the Domestic Appliance Laboratories for the gravimetric determination of domestic smoke. It is a single-stage, multi-tube precipitator of height 23 in., overall diameter 13 in. and weight approximately 15 lb. In use, it is placed on top of a domestic test chimney in the laboratory, so that all the flue gases pass through, the weight of smoke being determined by difference.

The instrument has since been used for an extensive survey (under contract to the Ministry of Technology, on behalf of the Ministry of Housing and Local Government) of the smoke emission from domestic fuels and appliances. One outcome of these investigations has been the publication of a British Standard "Method for the measurement of smoke from manufactured solid fuels for domestic open fires" (B.S. 3841: 1965). Under this test, the fuel is burnt at an average

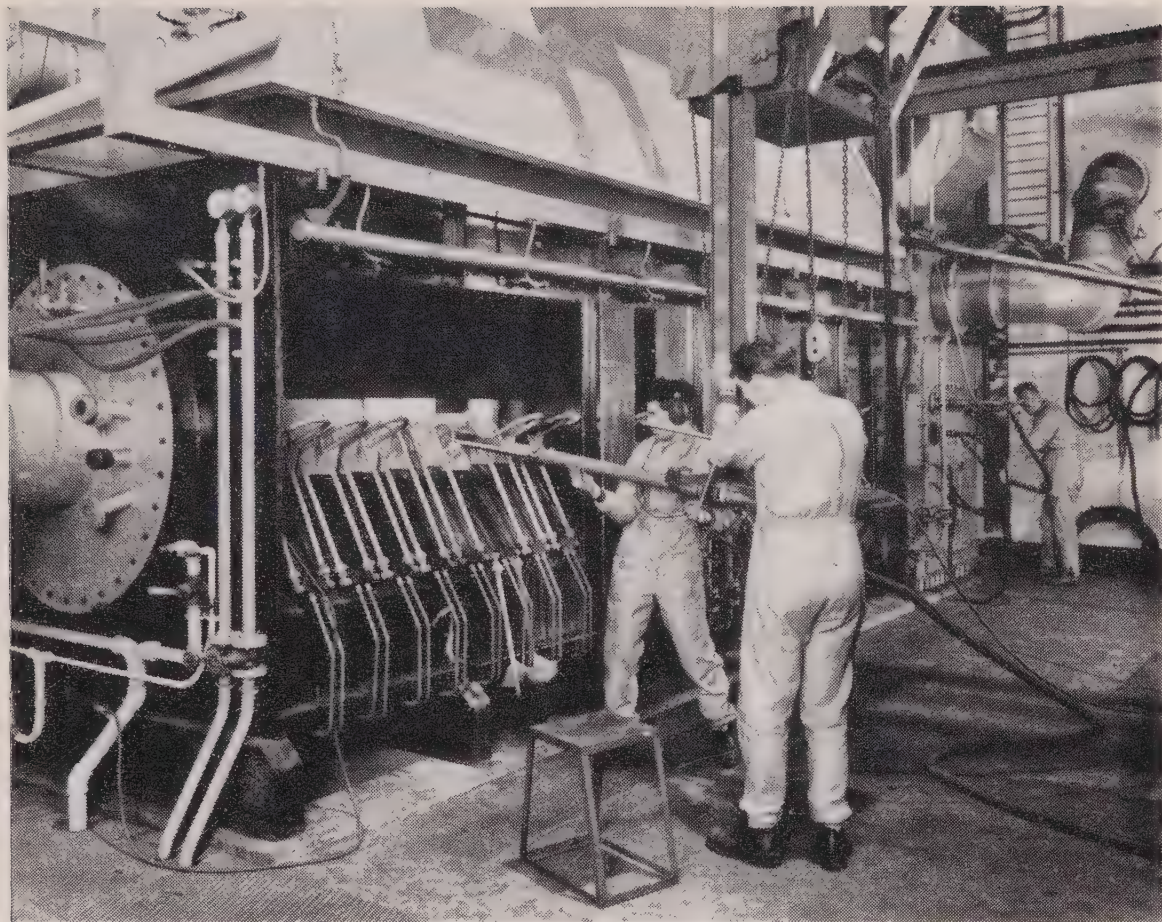
radiant output reasonably characteristic of normal domestic usage, and the weight of smoke emitted is determined by the B.C.U.R.A. electrostatic precipitator. On the recommendation of the British Standards Committee SFE/29 (on which the Association is represented) and the Clean Air Council, the Minister of Housing and Local Government has decided (Hansard, 10 February, 1966) that for a manufactured fuel to be authorised for use in Smoke Control Areas, the smoke emission by this B.S. test must be less than 5 g/h.

With the recent emphasis on the development of smokeless coal-fired boilers, the precipitator is being used to determine the smoke emission from prototype appliances.

Here, however, it has been found that the operation of the precipitator is sometimes unsatisfactory owing to electrical breakdown occurring before sufficient deposit for accurate weight determination has accumulated. As a first step towards possible modification of the precipitator, comparative measurements are being made of the electrical resistivity of the smoke from these appliances and from the open fire.

The B.C.U.R.A. Heat Meter

There is considerable interest at the present time in district heating, where a whole new town or re-developed area is supplied with hot water for central heating from a single boiler house. For the domestic user in such a scheme, heating is provided at the turn of a valve, yet, with solid fuel, the running costs are low because a large fully mechanized boiler can use the cheaper grades of coal. One obstacle in the way of district heating development is the lack of a meter, at a suitable price and acceptable accuracy, by means of which tenants can be charged for heat according to the amount they take out of the



Pulverized fuel test plant under test

system. The B.C.U.R.A. heat meter programme is aimed at developing such a meter.

Most meters measure both the water flow rate and the temperature difference between incoming ("flow") and outgoing ("return") water, and multiply them together. This procedure results in an expensive meter. The B.C.U.R.A. meter does not measure either flow rate or temperature difference, but obtains their product by indirect means. A small fixed fraction (say 1/200th) of the cooled outgoing water is diverted through a "side arm", and re-heated by means of a small electric heater to the temperature at which the water is entering the dwelling. The heat input needed to do this is then 1/200th of the heat consumption being measured. A domestic electricity meter measures the input to the small heater and is calibrated in units of heat consumption.

The diversion of water through the side arm is achieved by means of two

orifices. One, across which the side arm is connected, is in the "return" pipe, and the other, much smaller, orifice, is in the side arm. A control system adjusts the heat input to the side arm so that the temperature of the re-heated water matches the temperature in the "flow" pipe.

For the meter to remain accurate over wide ranges of water flow rates, water temperatures, and heat emissions, the heat losses from the side arm must be very low, the desired flow fraction (1/200th) must be maintained over a wide range of water flow rates, and the control system must match the two temperatures with a high order of accuracy. Many difficulties have been overcome, and certain features of side-arm design have been proved in field trials. The outstanding problem lies in getting the desired accuracy in the control system by methods which will not make the meter cost too high. Most success has been achieved using thermistors for temperature sensing,

and employing electronic systems of control. "On-off" and proportional systems of control are being examined.

Trickle Feeder Smokeless Boilers

Because of its much lower cost per therm, smaller storage space requirements, and lower ash content than solid smokeless fuels, coal represents an attractive fuel for domestic heating if it can be burnt efficiently and with low smoke emission. A central-heating boiler to burn bean or singles size coal is therefore being developed, in which the smoke-forming volatiles are emitted gradually and sufficiently high temperature conditions are maintained for their complete combustion with jets of secondary air.

A simple trickle-feeder mechanism pushes coal at a steady rate from the mouth of a hopper into the combustion chamber where it falls on top of a fuel bed whose surface is maintained at a constant level by two control electrodes. When the bed builds up to electrode level a current flows through the carbonized coal and operates a relay switching off the feed motor until the level falls again.

Combustion air is supplied by fans; the secondary air is introduced at high velocity through jets to give turbulence over the firebed. A water thermostat, controlling the fans and feeder, operates the boiler on an "on-off" basis, the mean feed rate varying with load. Combustion is maintained during the "off" periods by a small bleed of primary air. The control system incorporates delays both to ensure that secondary air is supplied while volatile emission continues just after fuel feeding has ceased and to prevent coal being fed before the temperature necessary for the ignition of volatiles has been attained.

Ash must be removed frequently, in small amounts to avoid undue disturbance of the fuel bed; automatic means of doing this are being developed.

Progress so far has shewn that low smoke emission and high efficiencies can be obtained. Further work is being done to improve the design, increase

the turn-down ratio and establish the range of coals which can be burnt by this method.

THE ANNUAL REPORT

The Annual Report of the Association for 1965, priced at two guineas, may be obtained from the Director of Intelligence and Publications, the British Coal Utilization Research Association, Leatherhead, Surrey.

It records an increase in income by £136,000 to over £730,000. About three-quarters of this increase however was due to a special contribution by the National Coal Board—together with the additional Ministry of Technology grant that this attracted—for developing a coal combustor for magnetohydrodynamic power generation. Apart from the much larger effort on this project, the general pattern of research was similar to that evolved in 1964. Integration of all programmes, particularly to relate objective basic researches more directly to applied work, was further improved.

A shell boiler at Leatherhead has been enabled to run unattended overnight by the fitting of additional automatic controls. A vibrating grate fitted to another boiler has proved to have efficiency-load characteristics similar to those of a chain-grate and to burn satisfactorily low-rank washed smalls.

Leeds P.H.I. Wins Award

Mr. Frank William Boshell (34), a Leeds Public Health Inspector, has been awarded a Winston Churchill Travelling Fellowship. Out of 3,303 applications the Winston Churchill Memorial Trust has awarded 66 travelling fellowships. The award is an indication the Trust sets on the question of clean air, for the purpose of Mr. Boshell's journey—for which he has been allowed six month's leave of absence—is to visit Pittsburgh and Los Angeles and to study American techniques and administrative methods in dealing with all forms of air pollution.

AIR POLLUTION

ABSTRACTS

850. Biologic Effects of Nitrogen Dioxide in Relation to Air Quality Standards. Cooper, W. C. and Tabershaw, I. R. (Arch. Env. Health, April 1966, **12**, 522-528.) Data on the biologic effects of nitrogen dioxide on man and lower animals over a wide range of concentrations has been reviewed and tabulated. Present evidence suggests that long-continued exposures should not exceed the range 0.5-1 p.p.m. This is based on the evidence of increased mortality in lower animals exposed to aerosolized micro-organisms after NO₂ exposures and the pathological effects demonstrable in animals continuously exposed to levels in the range of 4-5 p.p.m. Brief exposures of a general population should not exceed 3 p.p.m. over a period of one hour. This is based on the possible potentiation of infections and on the odour threshold. The above recommendations relate to the possible effects of NO₂ on health alone. They do not consider potentiation or additive effects nor any contributions to plant damage and visibility.

851. Investigation of Oil Burners for single family houses (in Danish). Lindaa, H. (Varme, No. 5, 1965.) In April 1965, the heating department of Teknologisk Institut carried out an investigation of the combustion conditions for 101 oil-fired central heating plants in single family houses in the surroundings of Copenhagen. The paper presents the results of this investigation in text and diagrams. The combustion quality was estimated by measuring the CO₂ content, soot number (Bacharach) and flue gas temperature. Besides other relevant characteristics of the plants were noted. The investigation gave as a result, that half of the burners produced too much soot, 75 per cent had too low CO₂ content and too high flue temperature, 78 per cent of the plants had chimney (flue gas) losses exceeding 20 per cent. The conclusions are, that oil burners of the said category do not receive constant servicing if any, and that only in very few cases inspection and control are carried out, which are recommended to the users of the plant.

852. Test on the Application of Powdered Additive to Heavy Fuel Oil (in Japanese). Yoshimoto Yasushi. (Clean Air and Heat Management, January 1966, **15**, No. 1, 10-22.) During eight months in 1963, the plant conducted a running test of a certain powdered fuel additive with its 50 t/h boiler. The paper describes the procedure in detail and concludes as follows: 1. Corrosion rate of air heater tubes was extremely decreased. 2. Ash became dry and high load boiler operations were maintained. 3. During operation there was no need to reduce heat which happened formerly because of blocked tubes. 4. Savings of expenses in maintenance and cleaning were realized.

853. Operation and Maintenance of Mechanical Dust Remover (in German). Engels, L.-H. (Staub-Reinhalt. Luft, April 1966, **26**, No. 4, 145-147.) After a brief description of the design of mechanical dust removal devices, the necessary operation control and maintenance work are outlined. The technical and economic aspects of daily, monthly and general annual servicing are discussed with the help of a maintenance plan for a dust removal installation of a waste rock crushing plant. It is pointed out that in some cases a maintenance contract is necessary, and an appropriate estimate of maintenance costs is given.

854. Origin, Purpose and Significance of Regulations of the VDI-Fachgruppe Staubtechnik (in German). Nagel, R. (Staub-Reinhalt. Luft, April 1966, **26**, No. 4, 141-145.) It is described how the first regulations of the VDI-Fachgruppe Staubtechnik were drawn up. The purpose of the regulations is then explained. They do not introduce anything new, and should not be considered as a manual, but rather should introduce clarity and a system in the existing documents. The importance of these regulations is explained in detail with regard to standardization of devices and methods which permit comparable results to be obtained. The problems arising are discussed with the help of some

technical terms such as "dust" and "dust fineness". Finally the purpose and structure of the new regulation 2264 is explained. This gives methods by which dust removal plants can always be kept in best conditions and in full operation capacity.

855. Studies on the Effect of Cement-Kiln Dust on Vegetation. Darley, E. F. (Journ. Air Poll. Control Assn., March 1966, **16**, No. 3, 145–150.) Laboratory experiments were conducted in Germany on the effect of three cement-kiln dusts on bean leaves. Dusts were applied to the expanding primary leaves at the rate of 0.6 to 3.8 g/M₂/8 hour dusting period for two to three days. Free moisture was added to the leaves during most of the tests. The dusting system used permitted only the finer particles to be deposited on the plants; it was later determined that most of the dust was less than 10 microns in diameter. Criteria for determining the effect of dust were to compare the rate of CO₂ exchange, or apparent photosynthesis, between dusted and non-dusted leaves, as well as to note injury to the leaves. All three dusts reduced the rate of CO₂ exchange, in most cases in excess of 30 per cent. One of the dusts caused considerable leaf injury, probably due to the fact that KCI was highly concentrated on the finer particles. Because the dusts carried considerably in chemical composition, particularly in calcium, potassium and sulphates, and because chemical composition varies considerably with particle size, the interaction of composition, size and deposition rate needs to be studied carefully.

856. Measures against air pollution from Refuse (in German). Schwarz, K. (Tech. Überw., November 1965, **6**, 385–389.) German air pollution laws demand that refuse incineration plants of any size must be connected to a chimney, its height depending on local conditions. The smallest plants can only be operated without flue gas cleaning, all others require some installation to prevent excessive smoke and fly ash emission; these may be, depending on size of plant, multiple chambers with after-combustion, dry or wet filters, cyclones or precipitators. Tests on large plants have shown that the dust content of the flue gas varies between 6 and 17.5 g/Nm³ at the furnace outlet (the higher value relating to travelling grates); the dust cleaning plant must guarantee a maximum dust content of the cleaned gas of 150

mg/Nm³ and this will almost always require electrostatic precipitators.

857. Field Investigation and Design of Insulated Chimneys. Ravenscroft, R. P. and Page, H. A. (Journ. Inst. Fuel, January 1966, **39**, No. 300, 22–28.) Attention is drawn to the occurrence of acid and condensation, accompanied by smuts in cladded chimneys. Field and laboratory experiments are described, and show that even at three-quarters boiler rating, condensation can occur and smuts formed. From simple theory a formula is derived from which it is possible to determine the metal temperature in a chimney. Alternatively by specifying a minimum metal temperature the thickness of insulation required to maintain this temperature can be calculated. With both insulated and uninsulated chimneys conditions under which smuts can be formed are shown to exist during the warming-up period of the boiler. Several types of chimney design are briefly described.

858. On the Problem of Motor-Vehicle Exhaust Gas (in German). Fiala, E. and Zeschmann, E. G. (MIRA). (A.T.Z. September and December 1965, **67**, Nos. 9 and 12, pp. 302–308 and 419–422.) The first part of the article is essentially a review of available information, much of it from American sources. Harmful exhaust-gas constituents include products of incomplete combustion, such as carbon monoxide (CO), hydrocarbons, soot, etc., and other combustion products, e.g. nitrogen and lead oxides. Causes of the emission of harmful gases are discussed. They include engine misfiring, scavenging losses, over-rich mixture, oil mist escaping through the crankcase breather, oil penetrating into the combustion chamber, and fuel evaporation from carburettor and fuel tank. Ways of reducing emissions are reviewed. Tests were carried out at the author's institute to compare the CO content of motor-vehicle exhaust gas and cigarette smoke. A diagram is presented which shows the exhaust-gas content of a 1.2 litre, four-stroke engine as a function of the idling-mixture-screw setting. As the idling mixture is usually adjusted "by ear" in service stations, three mechanics were asked to adjust the mixture in this way. The resulting exhaust CO-concentrations were approximately 5, 6 and 12 per cent, respectively. A fourth test subject, instructed to obtain the leanest mixture at which the engine would idle reliably, achieved a CO-concentration of less than

1 per cent. To stimulate traffic driving, dynamometer tests were made on an engine, the throttle of which was opened and closed at frequencies of between 4 and 30 times/min. The tests were made with a normal carburettor, with the carburettor accelerating pump removed, and with the fuel supply cut off at throttle openings of less than 12 deg. The results are presented in graphs showing CO-concentration as a function of throttle opening and of the frequency of opening and closing. Other points investigated were the effects of the pulsations of the air flow through the venturi and of the dilution of the fresh cylinder charge by residual gas (W.S.).

859. The North Sea Search for Oil and Gas. Wagner, G. A. (Journ. Inst. Fuel, May 1966, 39, No. 304, 225–228.) The author states the background to the North Sea search for oil and gas and the technical problems that have had to be overcome. The cost of building and equipping a marine drilling unit is estimated at between £2 million and £3 million, and its operating costs at upwards of £6,000 a day. The prospects of success are assessed, the characteristics of natural gas discussed and its competitive potential in the U.K. energy market analysed. The author concludes that North Sea exploration is a long-term venture that cannot bring quick commercial results or make much impact on existing energy patterns before the 1970s. Overall demand is growing fast enough for the U.K. market to be able to absorb all the natural gas the North Sea can reasonably be expected to produce, even if supplemented by imported gas. The market will not be dominated by the new fuel at the expense of the others. There will be an orderly development in which each fuel will fulfil the role best suited to it.

860. Uptake of Carbon Monoxide by Traffic Policemen (in Dutch). Bruin, A. de and Vroege, D. (Tijdschr. soc. Geneesk., 1965, 43 (5), 146–151.) The COHb-content of the blood of 36 municipal traffic policemen—all non-smokers—exposed to exhaust from motor vehicles in Rotterdam for 1–4 hours was measured. The findings were compared to those of a control group of 16 non-smoking policemen working in offices. Blood samples were taken before and after work. The COHb-content was on the average 0.93 per cent before work and increased to 1.11 per cent in the exposed group, whereas the COHb-content in the control group remained about the

same. The peak CO-content in the atmosphere was 5–15 p.p.m. The chemical analysis was carried out by two different methods.

861. An Effective Work Instrument: The Laboratory-Truck used by the Municipal Laboratory of Paris for Studying Air Pollution (in French). Chovin, P. and Lebbe, J. (Pollution Atmosphérique, January–March 1966, 8, No. 29, 1–11.) The Municipal Laboratory uses for its air pollution studies a laboratory truck which enables many chemical and physico-chemical determinations to be carried out. This mobile laboratory, which was set up by the Technical Services Department of the Prefecture of Police, is equipped with a generating set for short term studies and can easily be linked to the electricity distribution network for long term work. This assembly, which cost about 200,000 francs, is used daily by the Municipal Laboratory and has enabled many problems of air pollution to be studied, both inside large premises polluted by gas discharges, and in the open in the thoroughfares of the capital.

862. Study of Air Pollution by Bacteria at the Level of the "Towers" of Some Large Buildings at Marseilles (in French). Boizis, M. (Pollution Atmosphérique, January–March 1966, 8, No. 29, 12–33.) A description is first given of the sampling methods and of the bacteriological and chemical studies employed, as well as the apparatus used. After a first series of experiments carried out with the aim of discovering whether differences exist between the "towers" of large buildings and the streets and squares of Marseilles, samplings of air were taken from four parts of the city, corresponding to a central zone, an industrial zone, a seaside zone and a residential zone. These samplings were not taken during the warm season, but always in four types of weather: overcast, mistral, fine and rainy weather. The discussion of the quantitative and qualitative results of the studies, together with the accompanying graphs and curves, leads to the conclusion that the number of bacteria germs per cubic metre of air is markedly higher at the level of the upper floors of the towers than at a height of 1 metre from the ground. It is also higher in fine weather than during the mistral, and in overcast weather than during rainy weather. Finally, the microbial pollution decreases whereas there is an increase in the clinical pollution by CO and CO₂.

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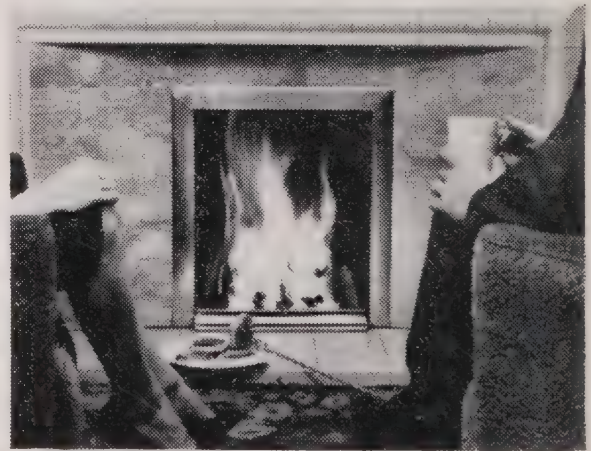
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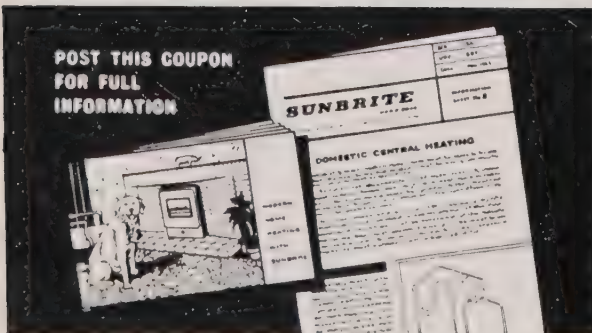
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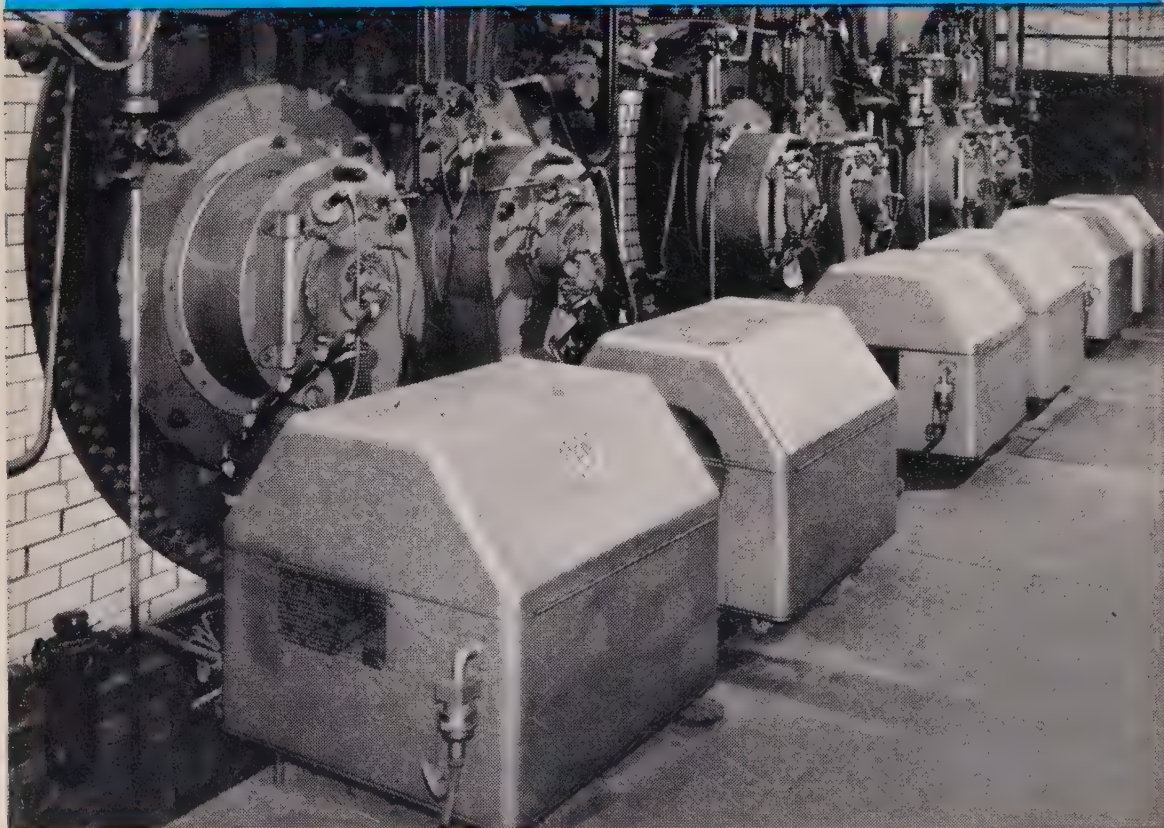
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